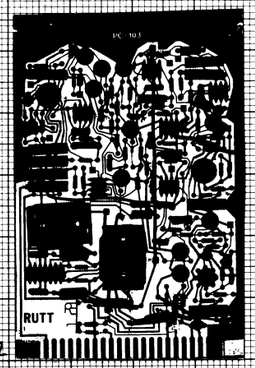
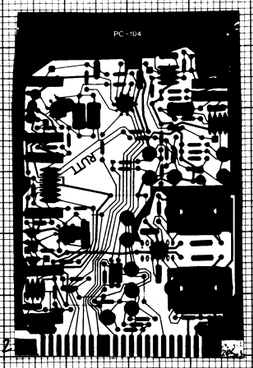
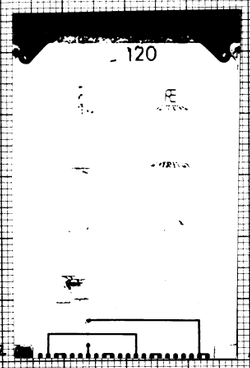
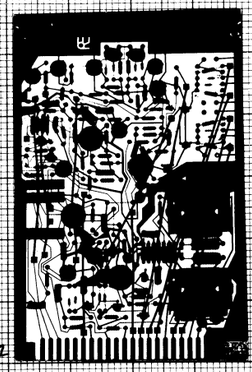
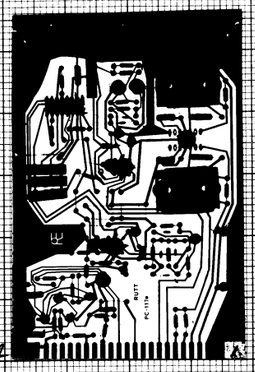
#1 #2 #3

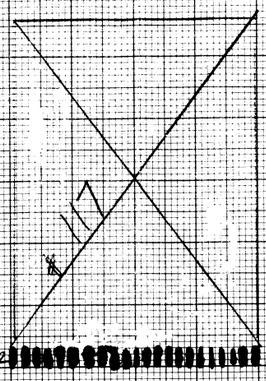


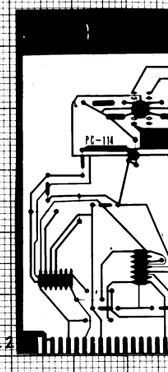






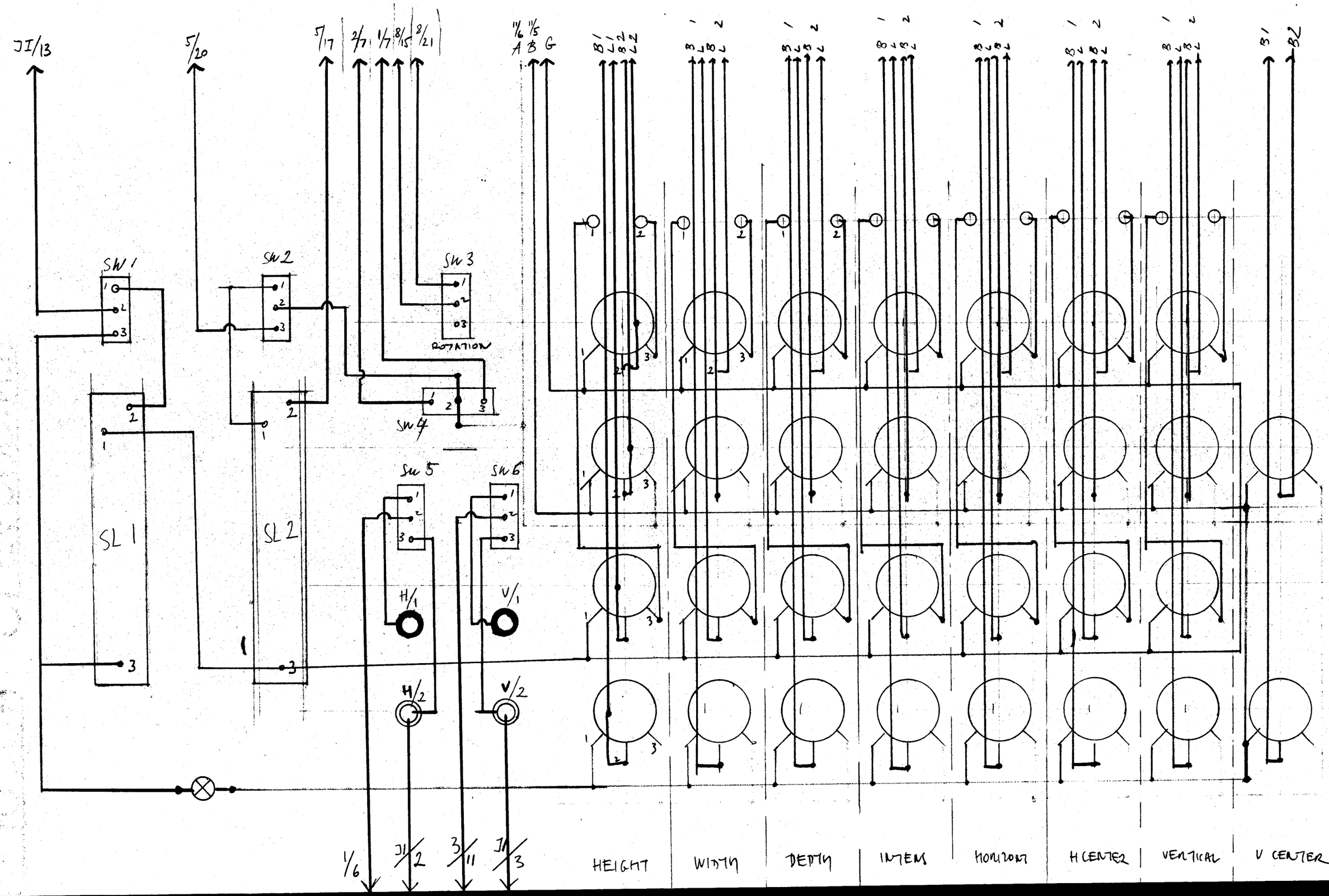




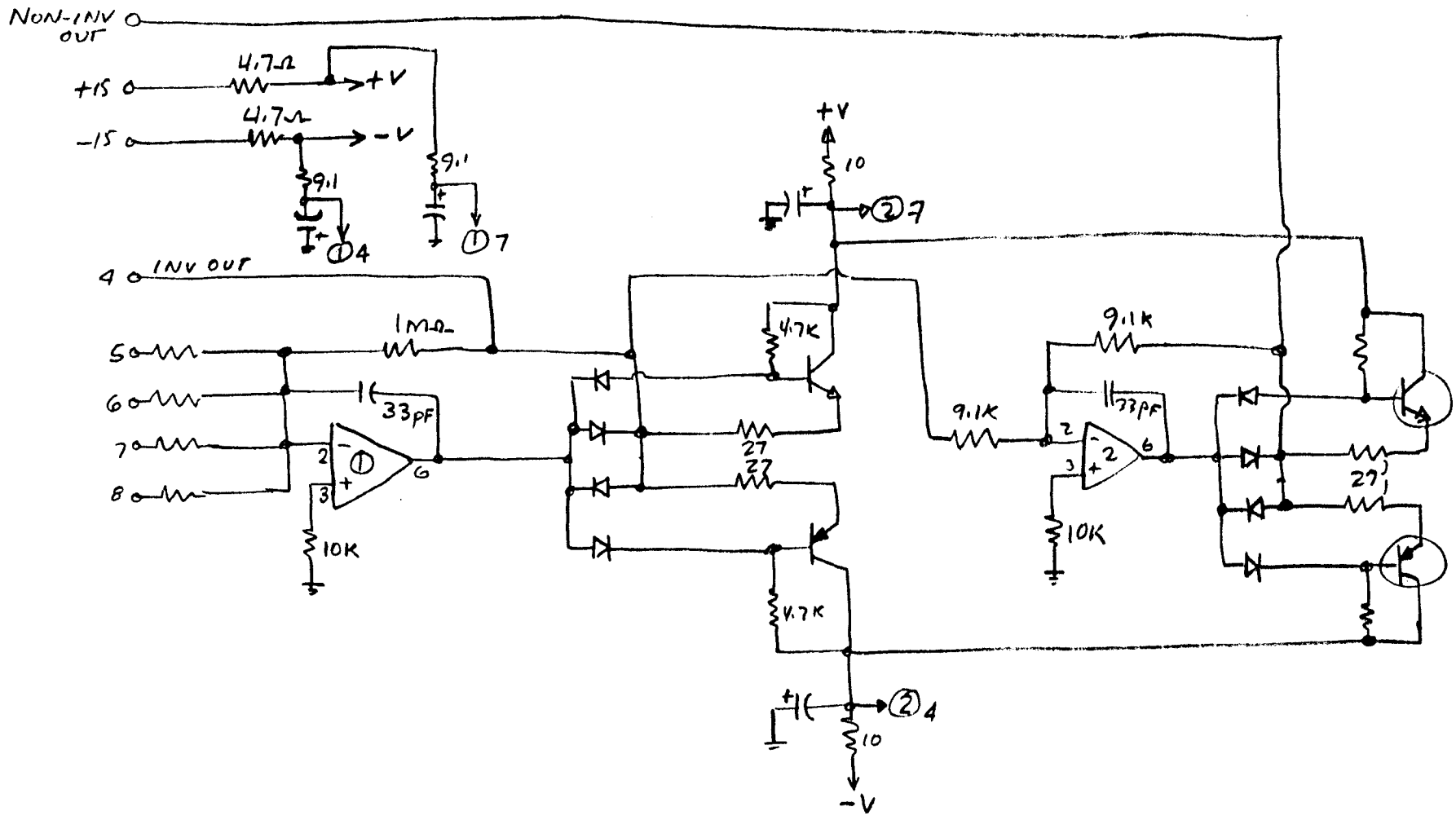


TIMING
HORIZONTAL
DEFLECTION BOARD

VERTICAL
TIMING
BOARD


JI/13
5/20
5/17
2/7
1/7
8/15
8/21
11/6
11/5
A B G
SW 1
SW 2
SW 3
SW 4
SW 5
SW 6
ROTATION
SL 1
SL 2
H/1
H/2
V/1
V/2
1/6
JI/2
3/11
JI/3
HEIGHT
WIDTH
DEPTH
INTENS
HORIZONT
H CENTER
VERTICAL
V CENTER

JI/13
5/20
5/17
2/7
1/7
8/15
8/21
11/6 A
11/5 B
G
B1
B2
SW 1
SW 2
SW 3
SW 4
SW 5
SW 6
ROTATION
SL 1
SL 2
H/1
V/1
H/2
V/2
1/6
JI/2
3/11
JI/3
HEIGHT
WIDTH
DEPTH
INTERS
HORIZONT
H CENTER
VERTICAL
V CENTER


NON-INV OUT
+15
-15
4.7Ω
4.7Ω
+V
-V
9.1
9.1
4
INV OUT
5
6
7
8
1MΩ
33pF
10K
4.7K
27
27
4.7K
10
+V
10
-V
9.1K
9.1K
33pF
10K
27

PC-54

TRONOTEC, INC.
Church Road Laboratory
Franklin, New Jersey

PARTS LIST

DATE 12/5/75 PROJECT RE 4½ ASSY ~~(DCU)~~ DISPLAY PC-116A DRAWING _____ SHEET 1 OF _____

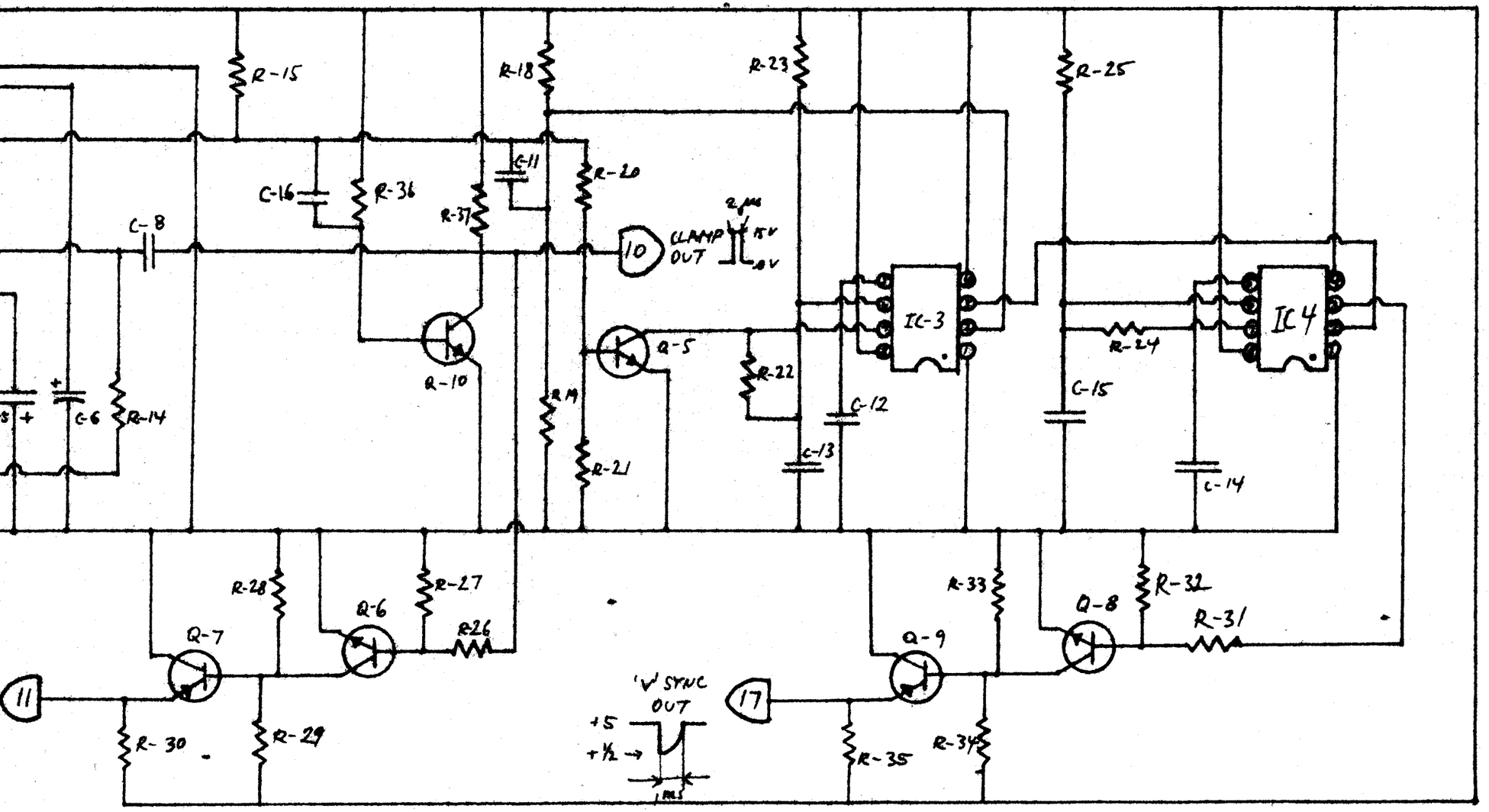
REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PN	QTY	UNIT	PRICE	TOTAL
IC1	COMPARATOR	LM311	NSC		1			
IC 3,4	TIMER	NE555V	SIG		2			
Q1,3,5,6, 8,10	NPN	2N3568			8			
Q2,7,9	PNP	2N3638A			3			
Q4	FET	2N4091			1			
D1,2	DIODE, SILICON, SIGNAL	1N914			2			
C1,3,5,6	Capacitor, Elect-Tant 15µF/20V				4			
C2,4,12, 14,15	" , Ceramic .1µF				5			
C7	" " 10pF				1			
C8	" Mylar 10nF				1			
C11	" Ceramic 100pF				1			
C13	" " 470pF				1			
C16	" " 220pF				1			
C17	" " 5pF				1			
R1,21,30, 32,35,27	Resistor - ¼W, 5% 1KΩ				6			
R2	" 270K				1			
R3	" 47K				1			

Franklin, New Jersey

PARTS LIST

DATE 12/5/75 PROJECT RE 4½ ASSY PC 116A (DCU) DRAWING _____ SHEET 2 OF ____

REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PN	QTY	UNIT	PRICE	TOTAL
R4,5,7	Resistor ¼W-5% 2K				4			
R6,18,20	" 10K				6			
R8	" 1MΩ				1			
R9	" 27K				1			
R10	" 4.7K				1			
R11,13	" 470Ω				2			
R12	" 27Ω				1			
R14,	" 100K				1			
R19,23	" 18K				2			
R22,24	" 75K				2			
R28,33	" 2.7K				2			
R29,34	" 5.1K				2			
R36	" 33K				1			
R37	" 2.2K				1			



PC-116

RUTT ELECTROPHYSICS

APR 1974

MODFIED TO 116A

TOP VIEW
G S
D

+15V (2)(12)

VIDEO IN (5)

R-1 C-1 R-2 R-3 R-4 R-5 R-6 C17 R-7

Q-1 Q-2

C-2 R-4 R-10

Q-3 R-8

Q-4 C-7 D-2

R-11 C3 R-12 R-13 C-4 C-5 C-6 R-14

R-15 C-8

C-16 R-36 R-37 C-11 R-18 R-20

(10) CL OU

Q-5 R-10 R19 R-21

-15V (9)

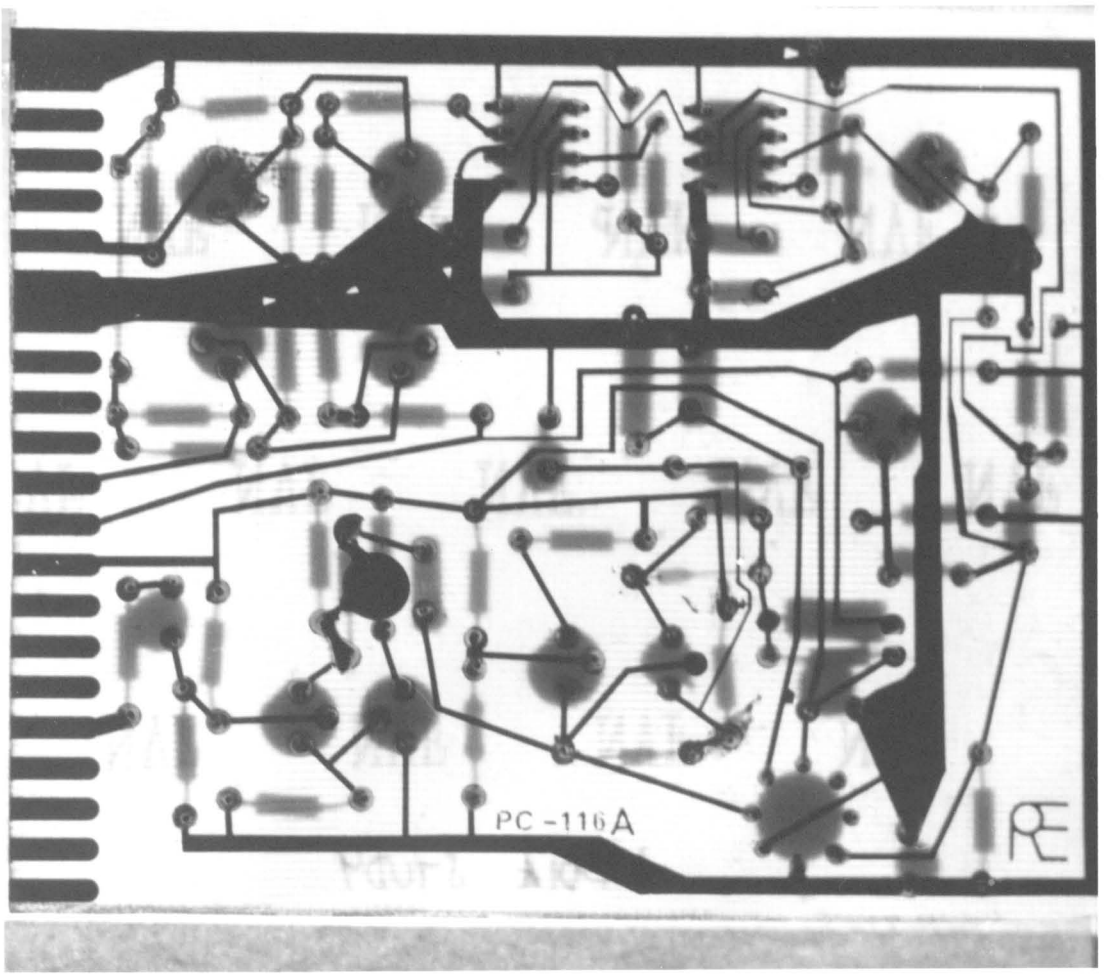
GND (5)(6)

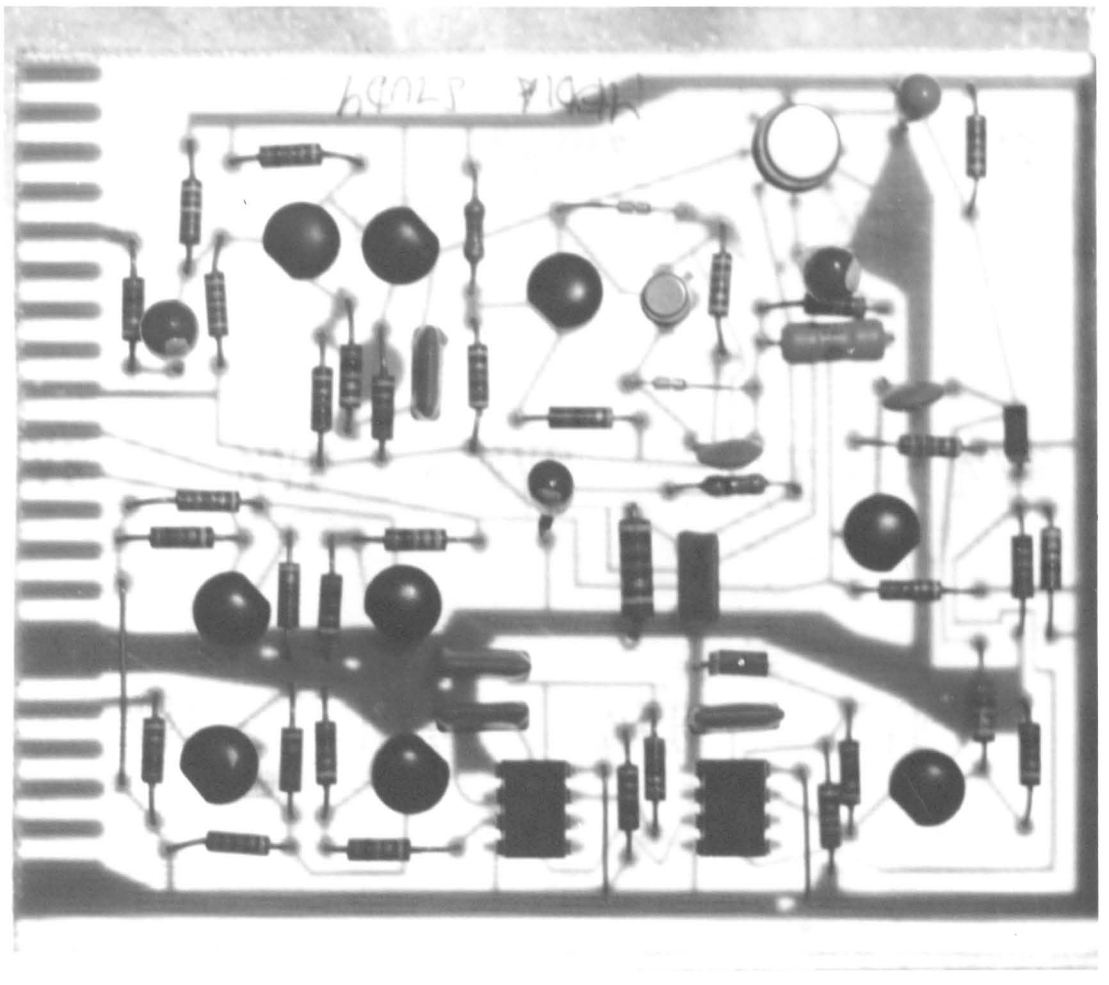
R-28 R-27 Q-6 Q-7 R26 R-30 R-29

(11)

'H' SYNC OUT
+5
+½
4 μsec

'V' SYN OUT
+5
+½
1 mS


PC-116A



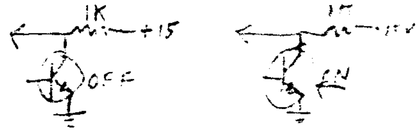
PC-104 'V'+'H' SWEEP + BLANKING OUTPUT

INPUTS

FROM

ROT. BLANK — UN-BLANK (ground) ← ; BLANK ← OPEN — BLANKS IF ROTATION MODULE IS ACCIDENTALLY DISCONNECTED.

'H' SWEEP BLANK (FROM 'B'H SWEEP OF [illegible] 103)

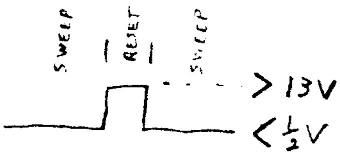


SIGNAL INCLUDES VIDEO & RETRACE BLANKING AS WELL AS Ø BLANKING

'V' POS, DUAL TRACE

BLANKS IF 'V' POS IS >±10V & ONE LINE WHEN PICTURE IS VERTICALLY CHOPPED

'H' SWEEP RESET



FROM 'B'H' SWEEP OF [illegible] (PC-103)

OUTPUTS

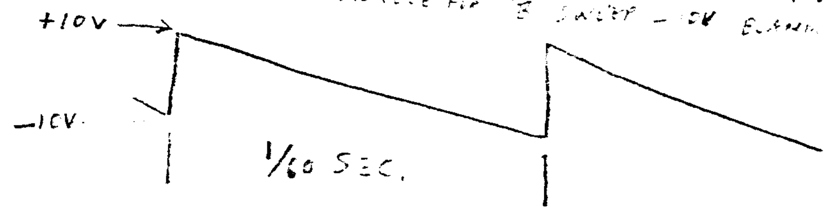
TO

'V' MODULE SYNC

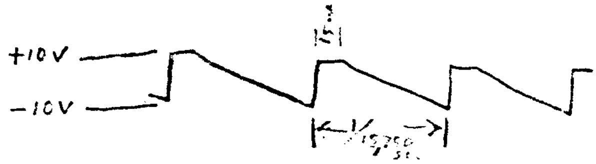
'H' MODULE SYNC

'H' -10V BLANK GND (GROUND THROUGH 'B'H SWEEP [illegible] & UN-GROUND TO DISABLE FOR 'B' SWEEP -10V BLANKING)

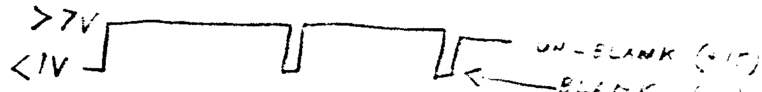
'V' SWEEP



'H' SWEEP



DISPLAY BLANKING (TO DISPLAY)



HCS 10

+100 MA
– 20 MA

PC-104

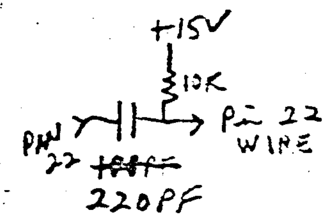
IC-1	SG-4501
IC-2	555 'V' RESET TIME
IC-3	555 'V' UN-BLANK
IC-4	555 'H' RESET TIME
IC-5	LM 318 'H' INTAGRATOR
IC-6	AH0133CD – AH0134CD FET. SWITCH
IC-7	LM 318 'V' INTAGRATOR
IC-8	LM 319 COMPARATOR SWEEP –11V BLANK

Q-1	NPN 40409
Q-2	PNP 40410
Q-3	NPN – 2N3565
Q-4	NPN –
Q-5	NPN –
Q-6	NPN –
Q-7	PNP
Q-8	NPN –
Q-9	PNP
Q-10	NPN –
Q-11	NPN –
Q-12	PNP
Q-13	NPN –

D-1	5V ZENER
D-2	5V ZENER
D-3	1N914

CHANGE TO 1K RESISTORS

ADD



SIZE		
4	C-1	.1 CER ✓
4	C-2	.1 CER ✓
4	C-3	.1µ CER ✓
3	C-4	15µ 20V TAN ✓
3	C-5	25µ 25V TAN ✓ (6.8 AT 35µ)
3	C-6	25µ 25V TAN ✓
4	C-7	220PF CER ✓
4	C-8	.1µ CER ✓
6	C-9	.1µ MYL ✓
4	C-10	.1 CER ✓
5	C-11	.1 MYL ✓
6	C-12	.1 MYL ✓
4	C-13	100PF CER ✓
4	C-14	100PF CER ✓
4	C-15	.1µ CER ✓
D	C-16	.001 MYL ✓
3	C-17	15µ 20V ✓
3	C-18	15µ 20V ✓
3	C-19	15µ 20V TAN ✓
D	C-20	.001µ MYL ✓
4	C-21	100PF CER ✓
4	C-22	15µ 20V TAN ✓
3	C-23	15µ 20V TAN ✓
5	C-24	.1µ MYL ✓
5	C-25	.1µ MYL ✓
3	C-26	15µ 20V TAN ✓
4	C-27	.1µ CER ✓

R-1	.5Ω 5
R-2	.5Ω 5
R-3	100K
R-4	4.7K
R-5	4.7K –
R-6	75Ω –
R-7	1K –
R-8	20K POT
R-9	75Ω –
R-10	33K –
R-11	100K POT
R-12	10K –
R-13	10K –
R-14	2.2K –
R-15	10Ω –
R-16	10Ω –
R-17	1K –
R-18	20K POT
R-19	75Ω –
R-20	20K POT
R-21	20K –
R-22	1K –
R-23	4.7K –
R-24	20K POT
R-25	10K –
R-26	2.2K –
R-27	10Ω –
R-28	10Ω –
R-29	2.7K –
R-30	1K –
~~R-30~~	~~20K~~
R-31	20K POT
R-32	[illegible]
R-33	10K –
R-34	20K POT
R-35	2.7K –
R-36	1K –
R-37	270Ω
R-38	270Ω
R-39	10K –
R-40	100K –
R-41	100K –
R-42	100K –
R-43	100K –
R-44	20K –
R-45	75Ω –
R-46	20K POT
R-47	75Ω –

CER – CERAMIC
TAN – TANTALUM
MYL – MYLAR

	STARTING POSITION	
R8		'V' RESET – SET TP-1 FOR 1250 µs POSITIVE PULSE WIDTH
R-11		'V' UN-BLANK – SET TP-2 FOR 15.5 Ms POSITIVE PULSE WIDTH
R-18		'H' RESET – SET TP-3 FOR 15µs POSITIVE PULSE WIDTH
R-20		'H' SWEEP RESET VOLTAGE – SET TP-4 FOR +10V
R-24		'H' SWEEP ΔV/ΔT
R-31		'V' SWEEP RESET VOLTAGE – SET TP-5 FOR +10V
R-34		'V' SWEEP ΔV/ΔT
R-46		–11V SWEEP BLANK – SET TP-6 TO –11V

H-5
38

+100 MA
− 20 MA

PC-104

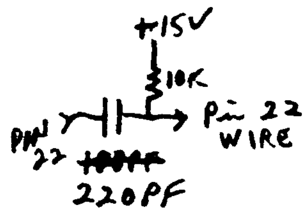
IC-1	SG-4501
IC-2	555 'V' RESET TIME
IC-3	555 'V' UN-BLANK
IC-4	555 'H' RESET TIME
IC-5	LM318 'H' INTAGRATOR
IC-6	AH0133CD or AH0134CD FET SWITCH
IC-7	LM318 'V' INTAGRATOR
IC-8	LM319 COMPARATOR SWEEP −11V BLANK

Q-1	NPN 40409
Q-2	PNP 40410
Q-3	NPN — 2N3565
Q-4	NPN —
Q-5	NPN —
Q-6	NPN —
Q-7	PNP
Q-8	NPN —
Q-9	PNP
Q-10	NPN —
Q-11	NPN
Q-12	PNP
Q-13	NPN —

D-1	5V ZENER
D-2	5V ZENER
D-3	1N914

CHANGE TO 1K RESISTORS

ADD



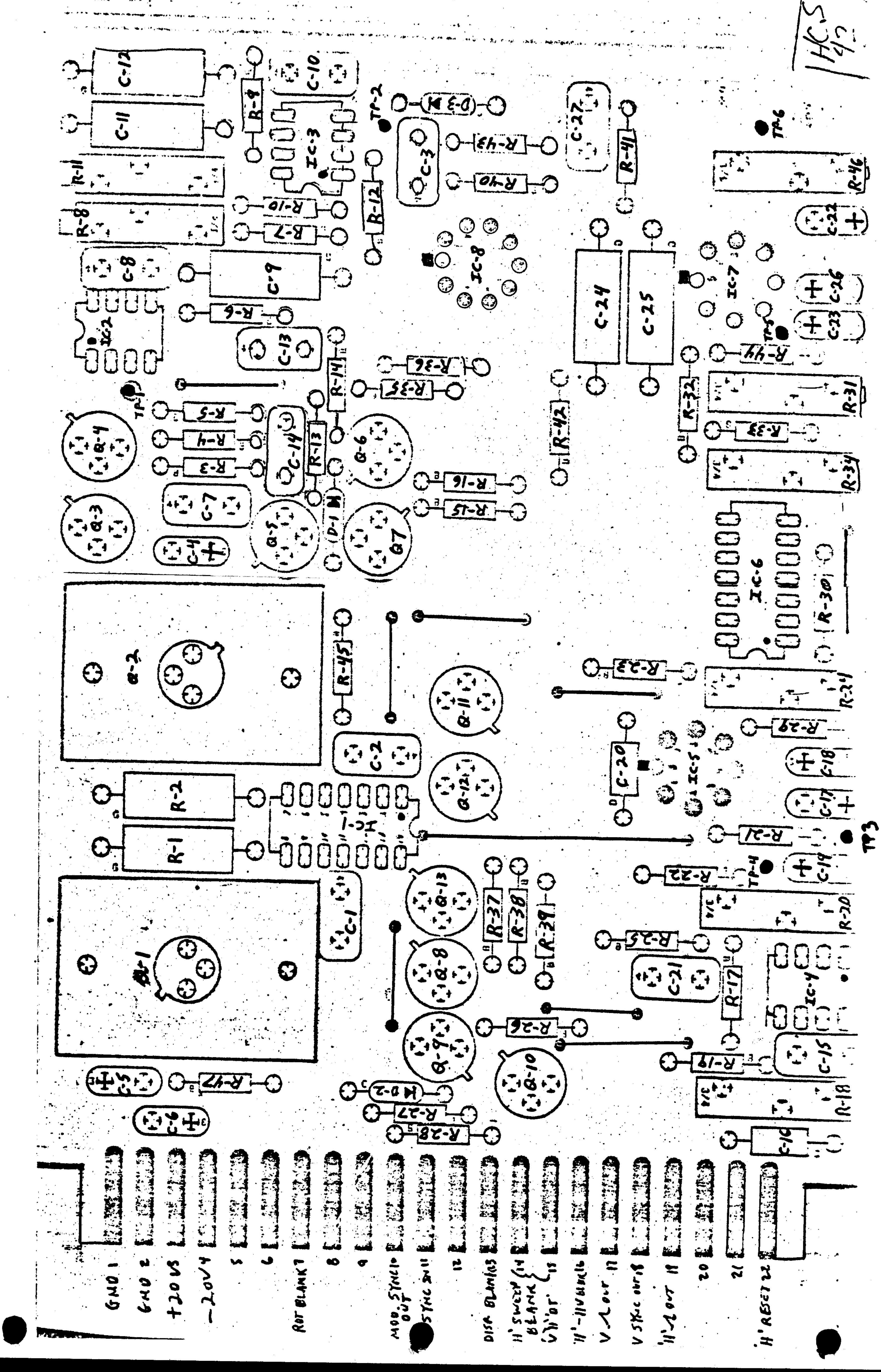
SIZE		
4	C-1	.1 CER ✓
4	C-2	.1 CER ✓
4	C-3	.1µf CER ✓
3	C-4	15µf 20V TAN ✓
3	C-5	25µf 25V TAN ✓ (6.8 AT 35V)
3	C-6	25µf 25V TAN
4	C-7	220PF CER ✓
4	C-8	.1µf CER ✓
6	C-9	.1µf MYL ✓
4	C-10	.1 CER ✓
6	C-11	.1 MYL ✓
6	C-12	.1 MYL ✓
4	C-13	100PF CER ✓
4	C-14	100PF CER ✓
4	C-15	.1µf CER ✓
0	C-16	.001 MYL ✓
3	C-17	15µf 20V ✓
3	C-18	15µf 20V ✓
3	C-19	15µf 20V TAN ✓
0	C-20	.001µf MYL ✓
4	C-21	100PF CER ✓
4	C-22	15µf 20V TAN ✓
3	C-23	15µf 20V TAN ✓
6	C-24	.1µf MYL ✓
6	C-25	.1µf MYL ✓
3	C-26	15µf 20V TAN ✓
4	C-27	.1µf CER ✓

R-1	.5Ω (5W)
R-2	.5Ω (5W)
R-3	100K
R-4	4.7K
R-5	4.7K
R-6	75Ω
R-7	1K −
R-8	20K POT
R-9	75Ω −
R-10	33K −
R-11	100K POT
R-12	10K −
R-13	10K −
R-14	2.2K −
R-15	10Ω −
R-16	10Ω −
R-17	1K −
R-18	20K POT
R-19	75Ω −
R-20	20K POT
R-21	20K −
R-22	1KΩ −
R-23	4.7K −
R-24	20K POT
R-25	10K −
R-26	2.2K −
R-27	10Ω −
R-28	10Ω −
R-29	2.7K −
R-30	1K
R-30	20K
R-31	20K POT
R-32	[redacted]
R-33	10K −
R-34	20K POT
R-35	2.7K −
R-36	1K −
R-37	270Ω
R-38	270Ω
R-39	10K
R-40	100K
R-41	100K
R-42	100K
R-43	100K
R-44	20K
R-45	75Ω
R-46	20K POT
R-47	75Ω

STARTING POSITION	
R8	'V' RESET – SET TP-1 FOR 1250ms POSITIVE PULSE WIDTH
R-11	'V' UN-BLANK – SET TP-2 FOR 15.5Ms POSITIVE PULSE WIDTH
R-18	'H' RESET – SET TP-3 FOR 15ms POSITIVE PULSE WIDTH
R-20	'H' SWEEP RESET VOLTAGE – SET TP-4 FOR +10V
R-24	'H' SWEEP ΔV/ΔT
R-31	'V' SWEEP RESET VOLTAGE – SET TP-5 FOR +10V
R-34	'V' SWEEP ΔV/ΔT
R-46	−11V SWEEP BLANK – SET TP-6 TO −11V

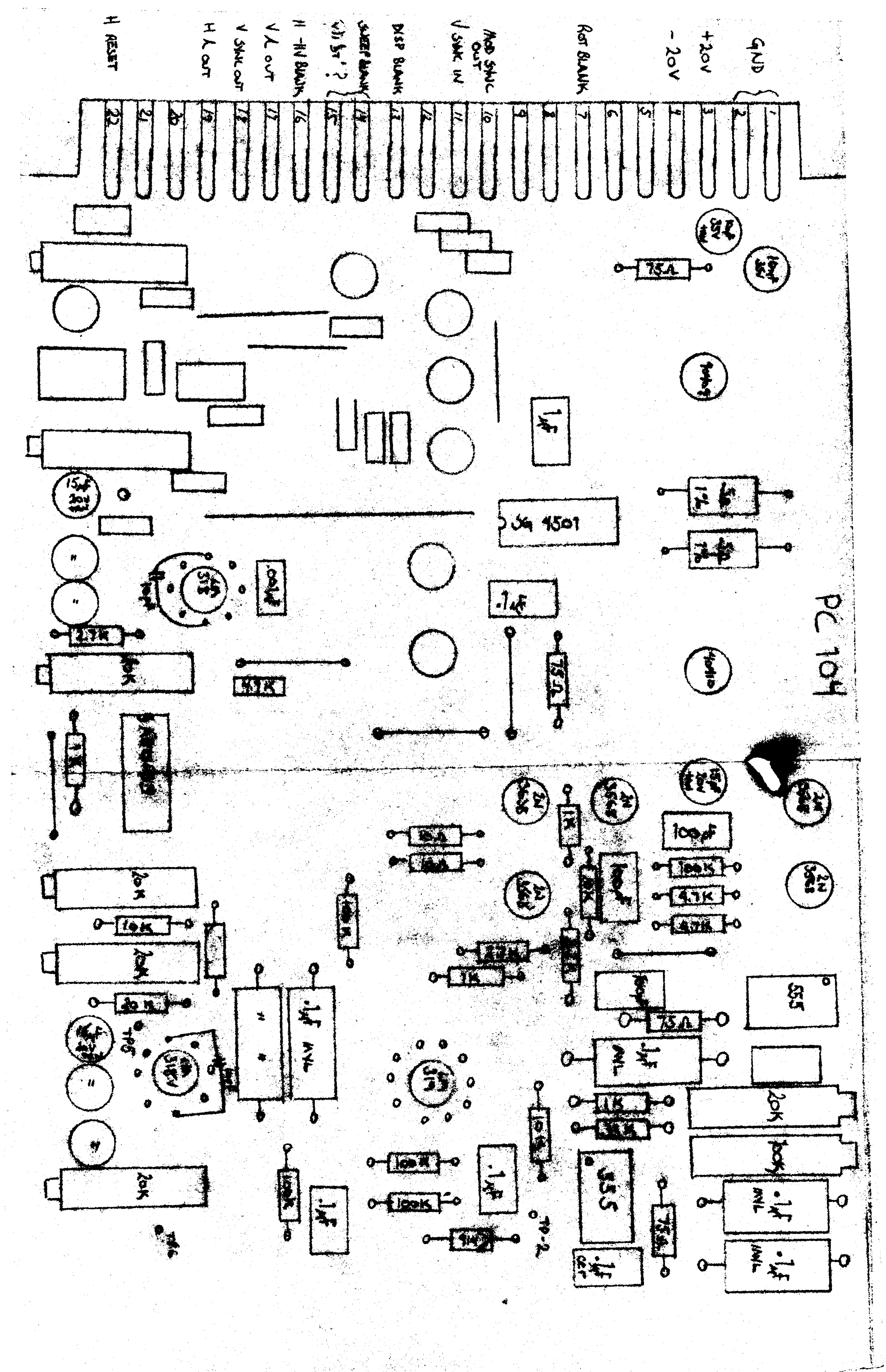
CER – CERAMIC
TAN – TANTALUM

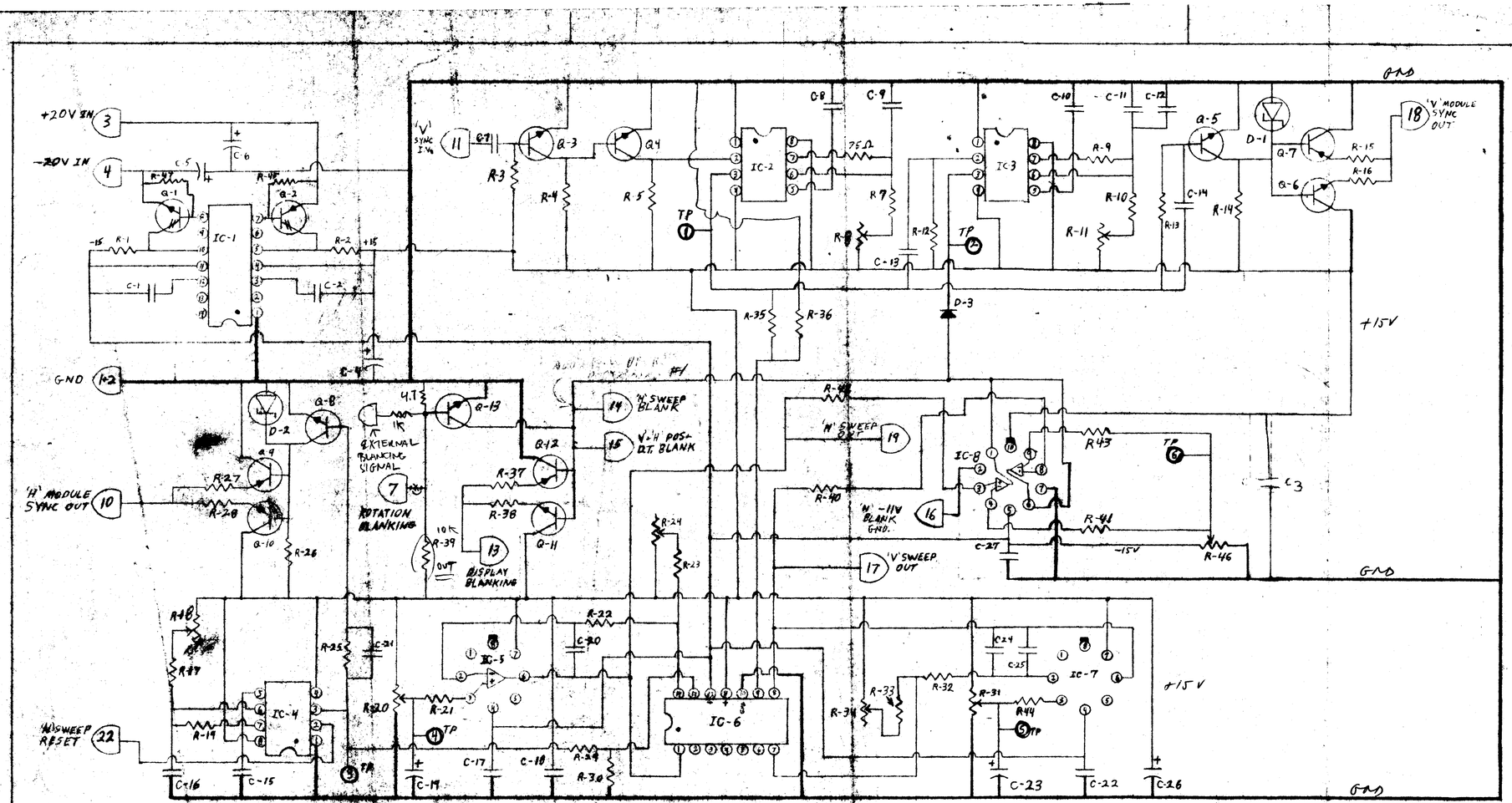
PC-104



HCS 4/2
GND 1
GND 2
+20 VS
-20 V 4
5
6
ROT BLANK 7
8
9
12
IC-1
IC-2
IC-3
IC-4
IC-5
IC-6
IC-7
IC-8
H' RESET 22

PRINT 6


H RESET
H ∧ OUT
V SYNC OUT
V ∧ OUT
H-IN BLANK
SWEEP BLANK
DISP BLANK
V SYNC IN
MOD SYNC OUT
ROT BLANK
-20V
+20V
GND
PC 104



PC-104

SE MODIFICE

FOR GX7

PC-104

SE MODIFIC

FOR CX7

GND

'V' SYNC IN

11

C-7

Q-3

Q4

R-3

R-4

R-5

C-8

C-9

IC-2

75Ω

R-7

R-8

C-13

R-12

TP 1

TP 2

IC-3

C-10

C-11

C-12

R-9

R-10

R-11

Q-5

D-1

Q-7

Q-6

R-15

R-16

18 'V' MODULE SYNC OUT

C-14

R-13

R-14

D-3

R-35

R-36

+15V

R-19

14 'H' SWEEP BLANK

15 V+H POS. DT. BLANK

Q-12

R-37

R-38

Q-11

10↑ R-39 OUT

13 DISPLAY BLANKING

R-24

R-23

R-40

'H' SWEEP OUT 19

'H' -11V BLANK GND. 16

IC-8

R43

TP 6

C3

R-41

-15V

R-46

C-27

17 'V' SWEEP OUT

GND

R-22

C-20

IC-5

R-21

TP 4

C-17

C-18

R-29

R-30

C-19

IC-6

R-33

R-34

R-32

R-31

R44

TP 5

C24

C-25

IC-7

+15V

C-23

C-22

C-26

GND

PC-104

SE MODIFICATION FOR EXT BLKING

HCS 17

PC-104

SE MODIFICATION FOR GX7 BLKING

GND

'V' SYNC IN

11

C-7

Q-3

Q4

R-3

R-4

R-5

IC-2

C-8

C-9

75Ω

R-7

R-8

C-13

R-12

TP 1

TP 2

IC-3

C-10

C-11

C-12

R-9

R-10

R-11

Q-5

D-1

Q-7

Q-6

R-15

R-16

C-14

R-13

R-14

18 'V' MODULE SYNC OUT

D-3

+15V

R-35

R-36

Q-13

Q-12

R-37

R-38

Q-11

10K R-39

13 DISPLAY BLANKING OUT

14 'H' SWEEP BLANK

15 V+H POS. D.T. BLANK

'H' SWEEP OUT 19

R-40

'H' -11V BLANK GND. 16

'V' SWEEP OUT 17

IC-8

R43

TP 6

C3

R-41

C-27

-15V

R-46

GND

R-24

R-23

R-22

C-20

IC-5

R-21

TP 4

C-17

C-18

R-29

R-30

C-19

IC-6

R-33

R-34

R-32

R-31

R44

TP 5

C-24

C-25

IC-7

+15V

C-23

C-22

C-26

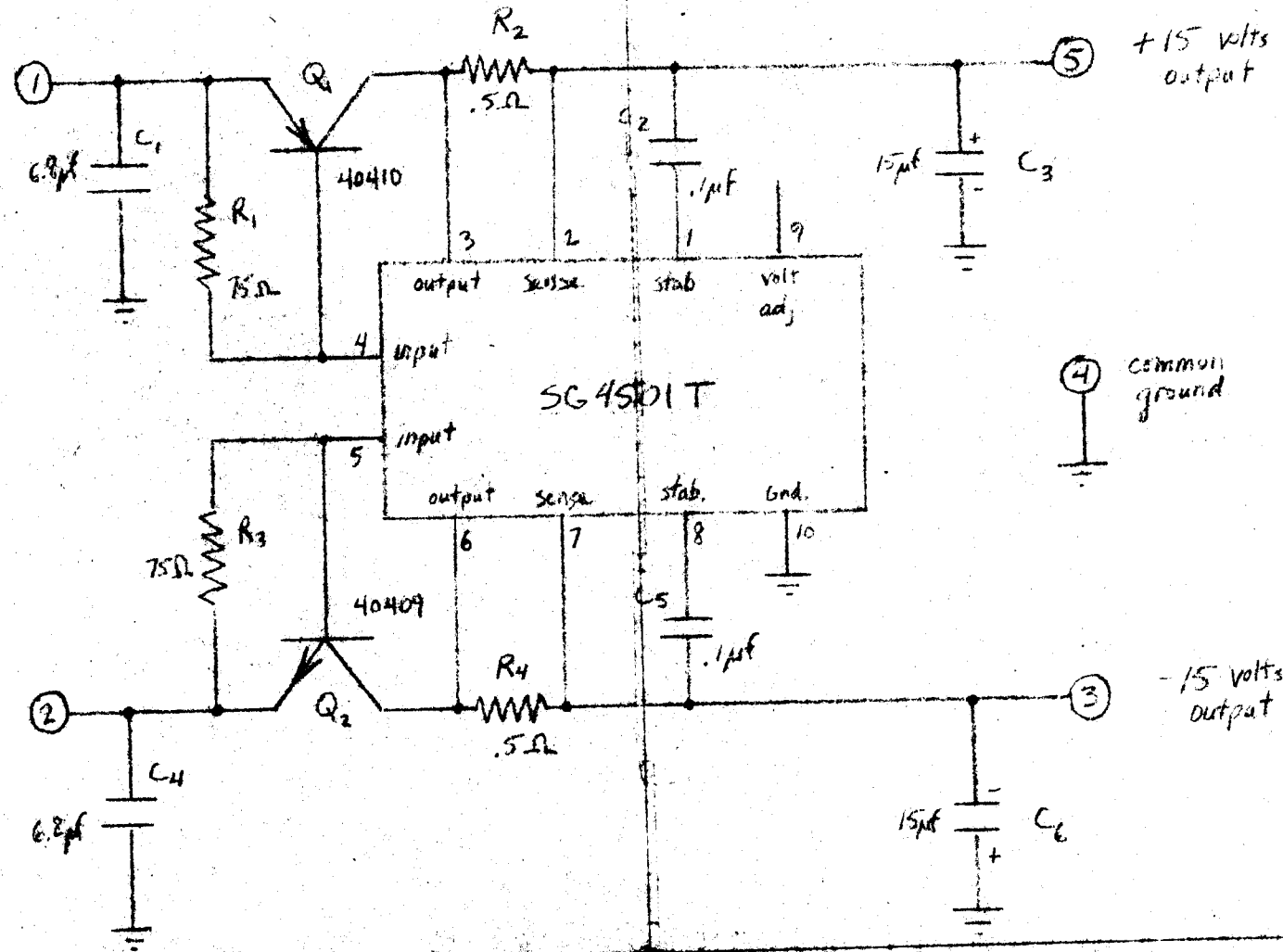
GND

HCS 17

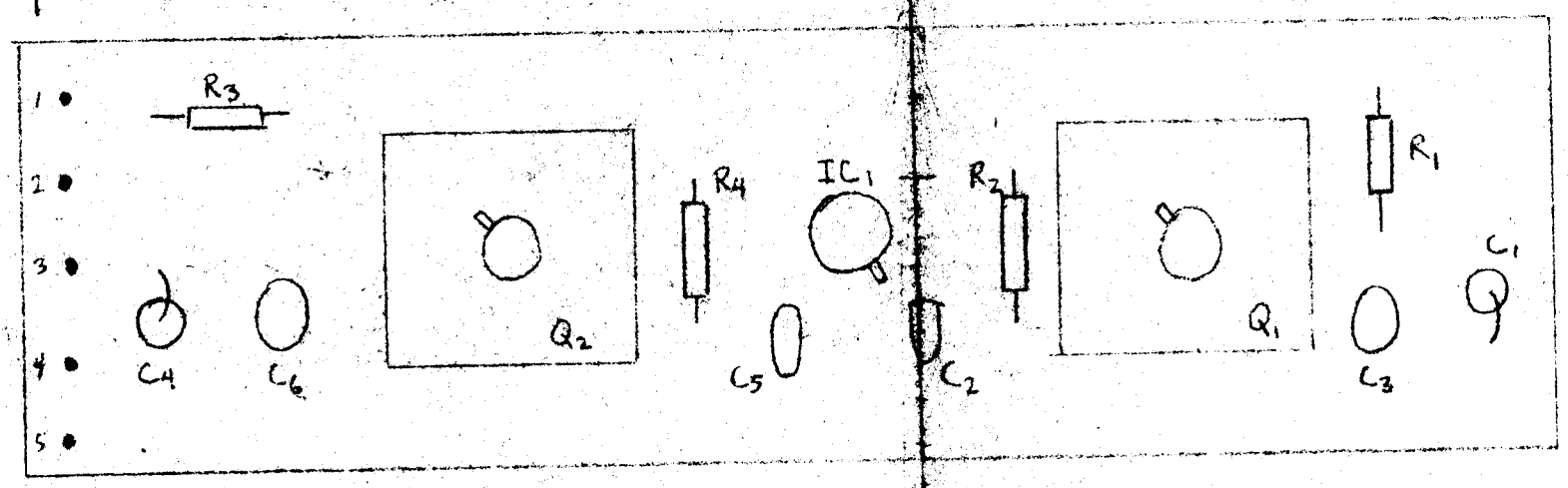
PC 105

± 15 V REGULATED POWER SUPPLY BOARD

(C JAMES)



Top View

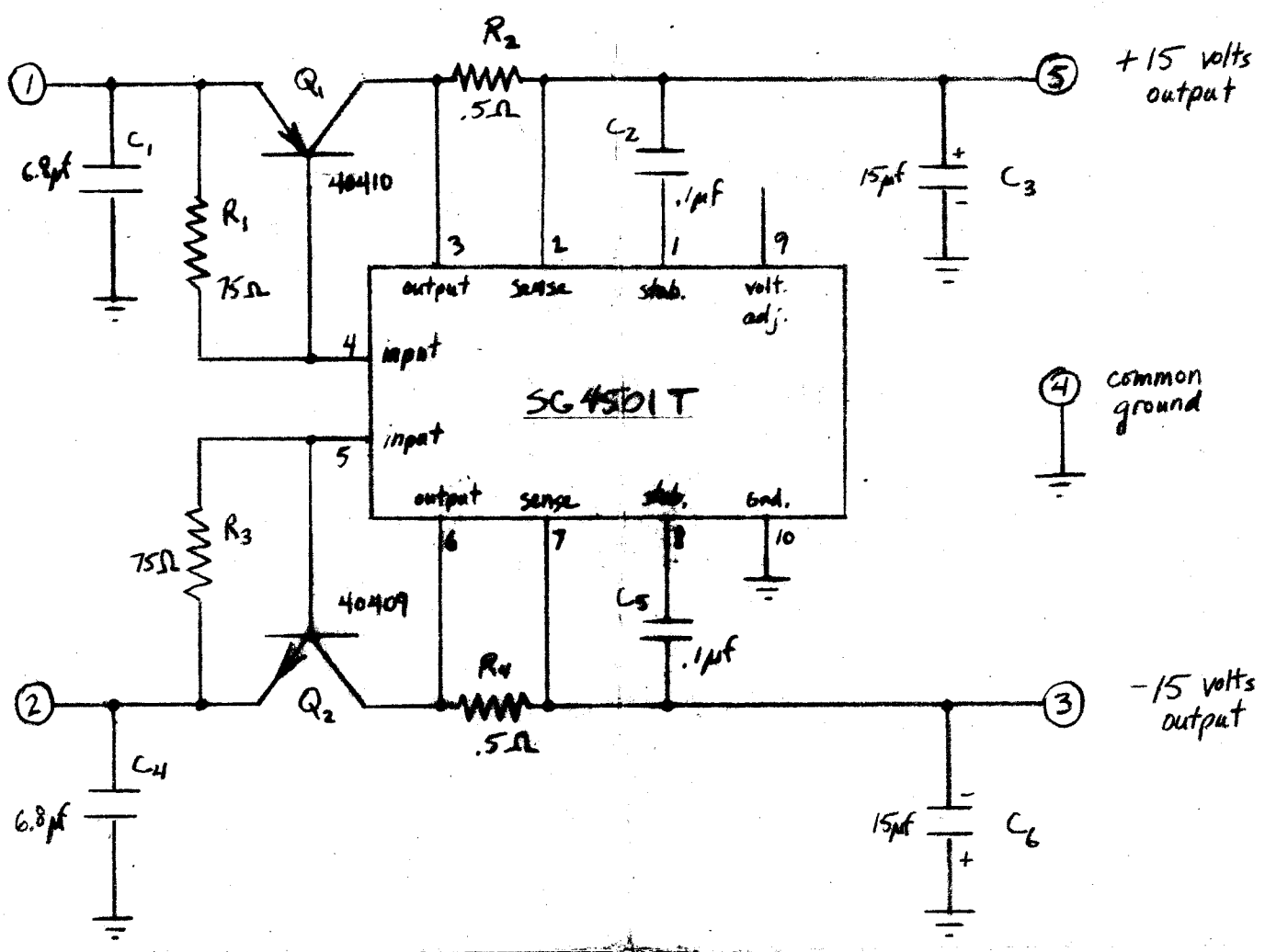


PC 105 -

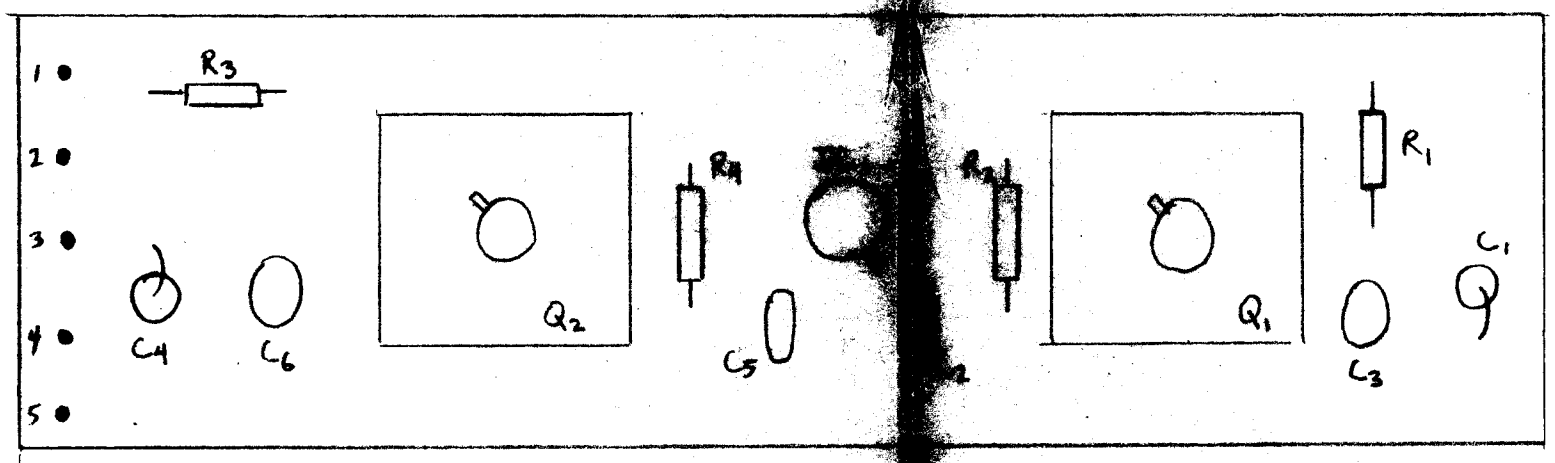
power supply

PC 105
± 15 V REGULATED
POWER SUPPLY BOARD

(C JAMES)

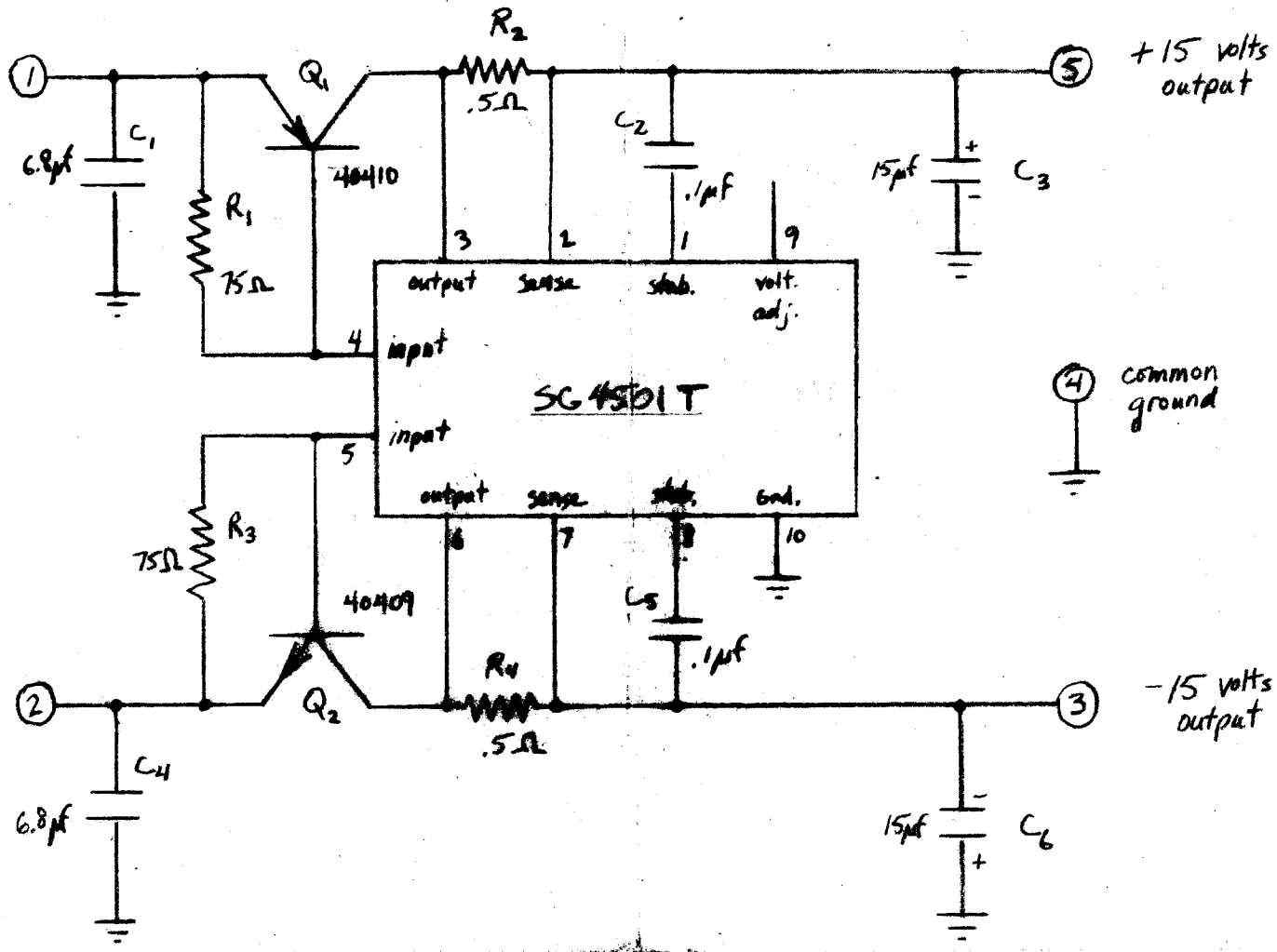


Top View

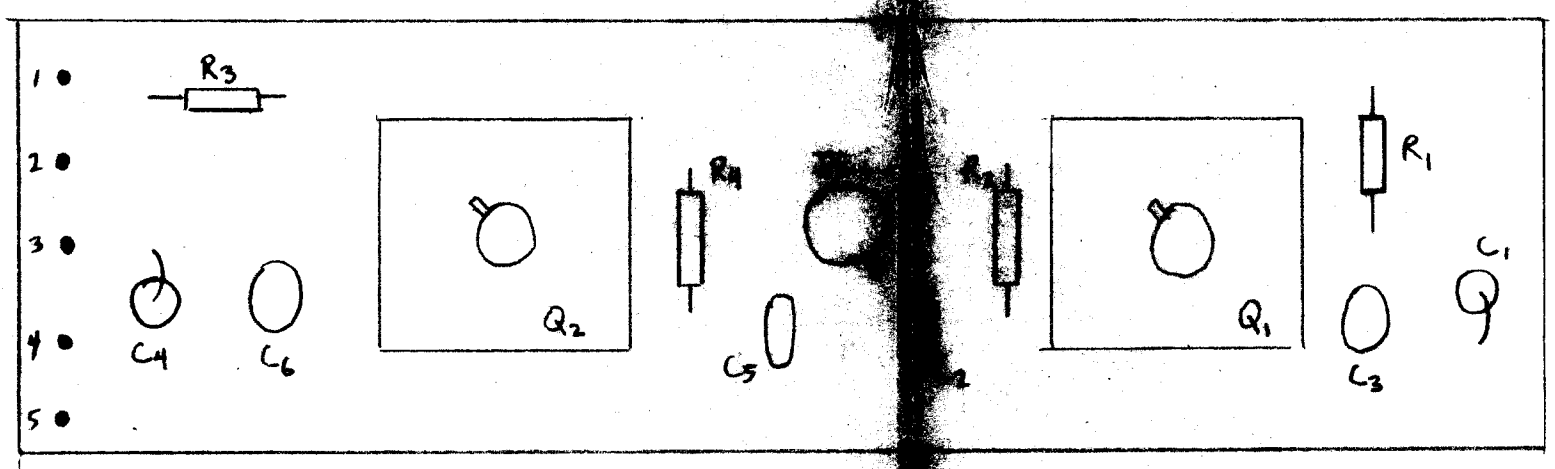


PC 105 - ±15v Regulated
power supply board

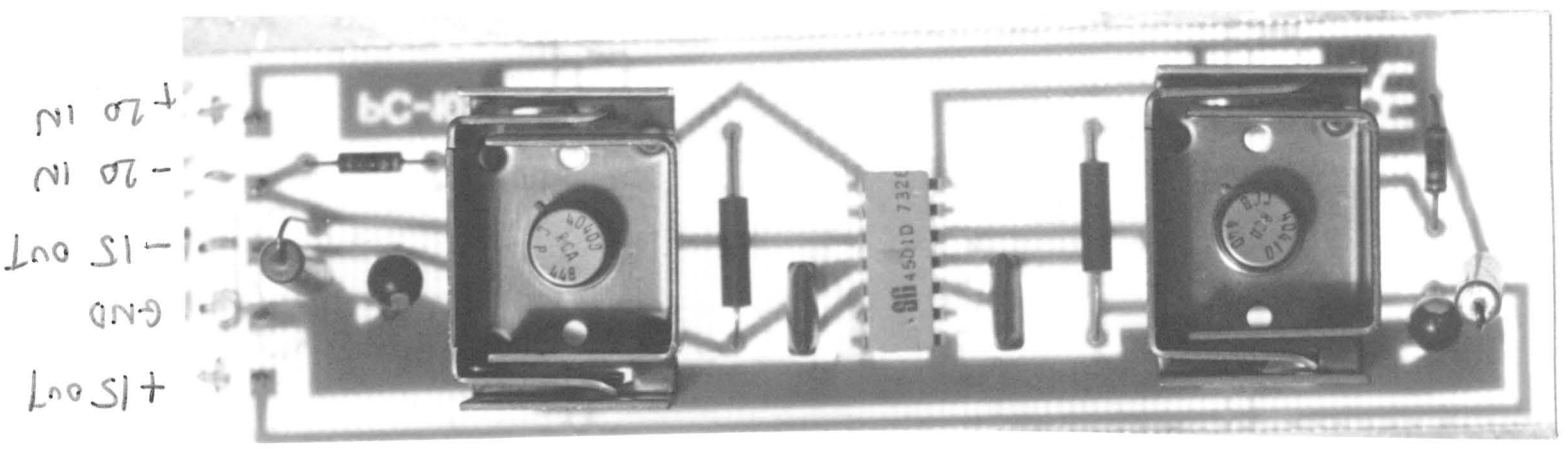
PC 105
± 15 V REGULATED
POWER SUPPLY BOARD
(C JAMES)

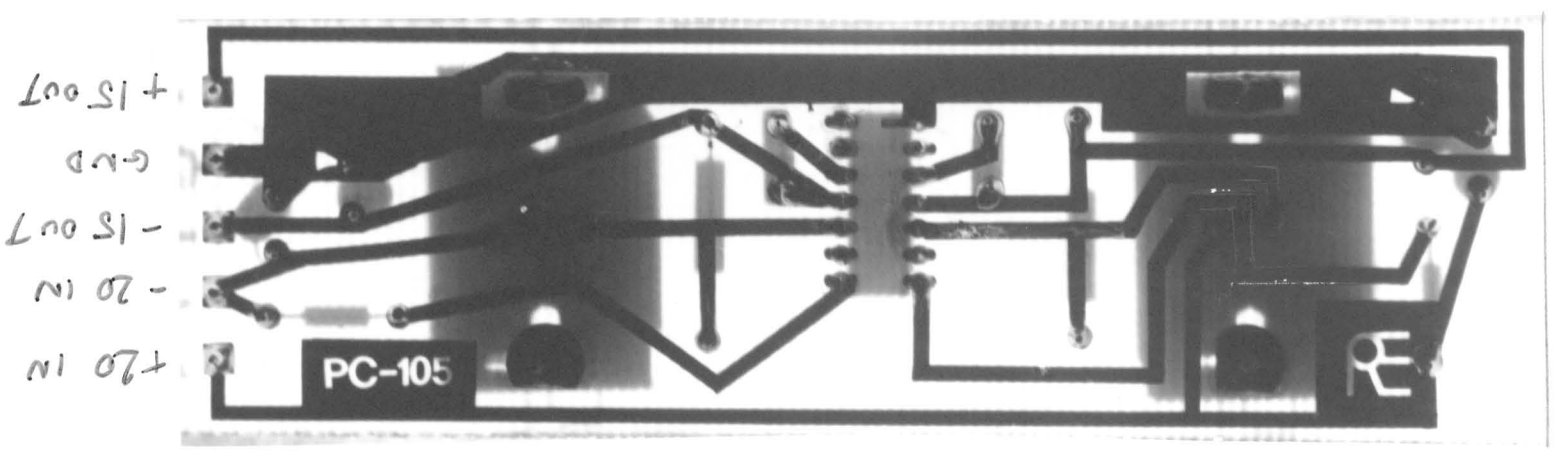


Top View

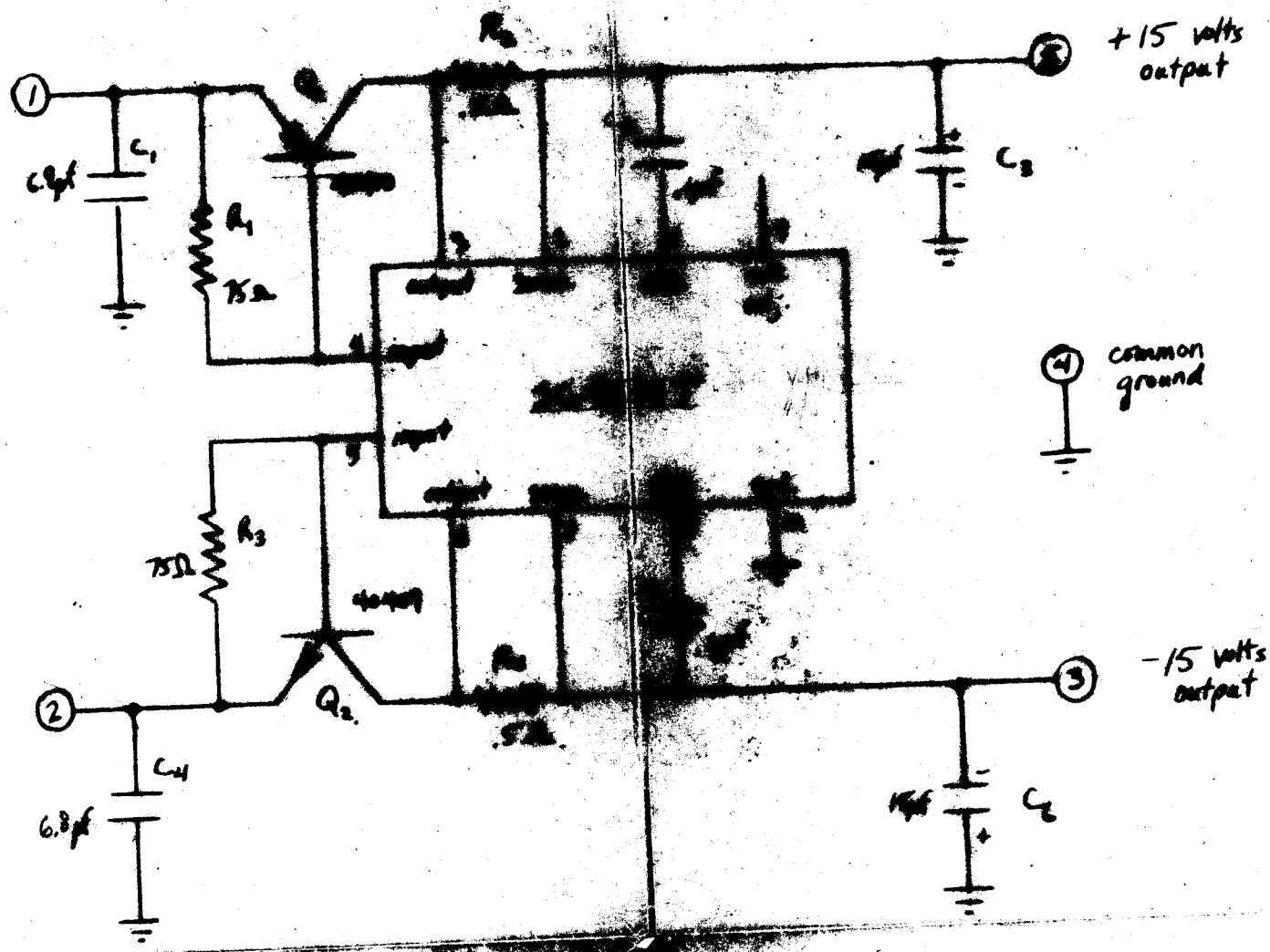


PC 105 - ±15v regulated
power supply board

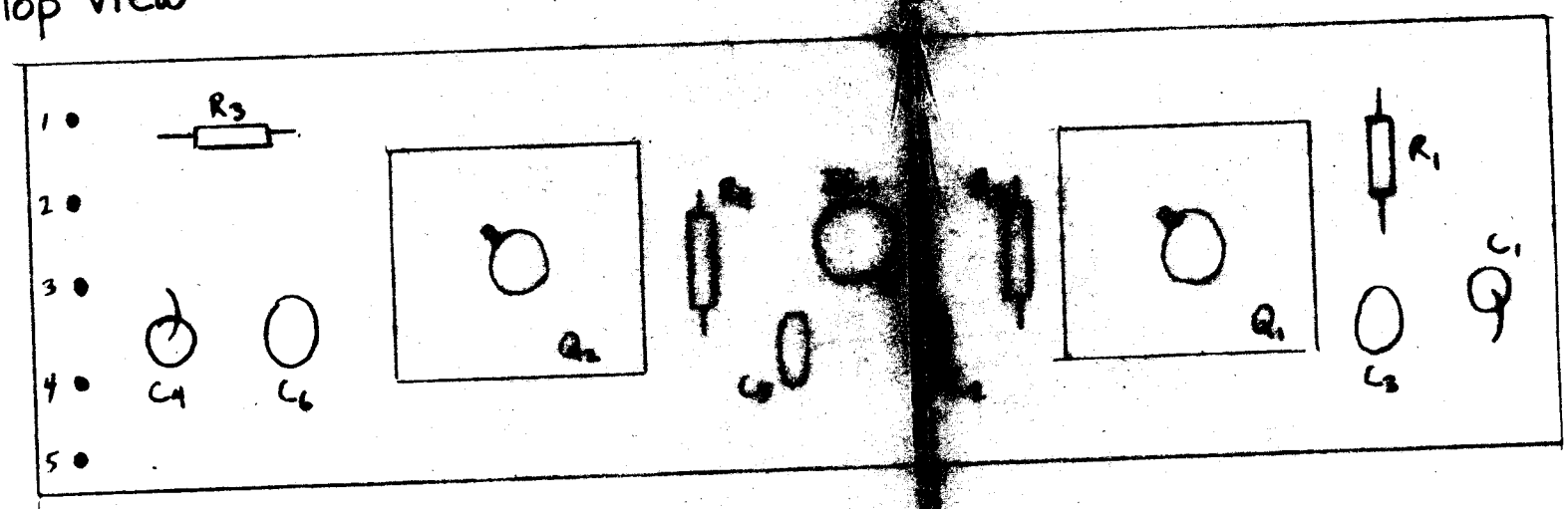

+20 IN
-20 IN
-15 OUT
GND
+15 OUT
SG 4501D 7321


+20 IN
-20 IN
-15 OUT
GND
+15 OUT
PC-105

PC 105
± 15 V REGULATED
POWER SUPPLY BOARD
(L JAMES)



Top View



PC 105 - ±
power supply

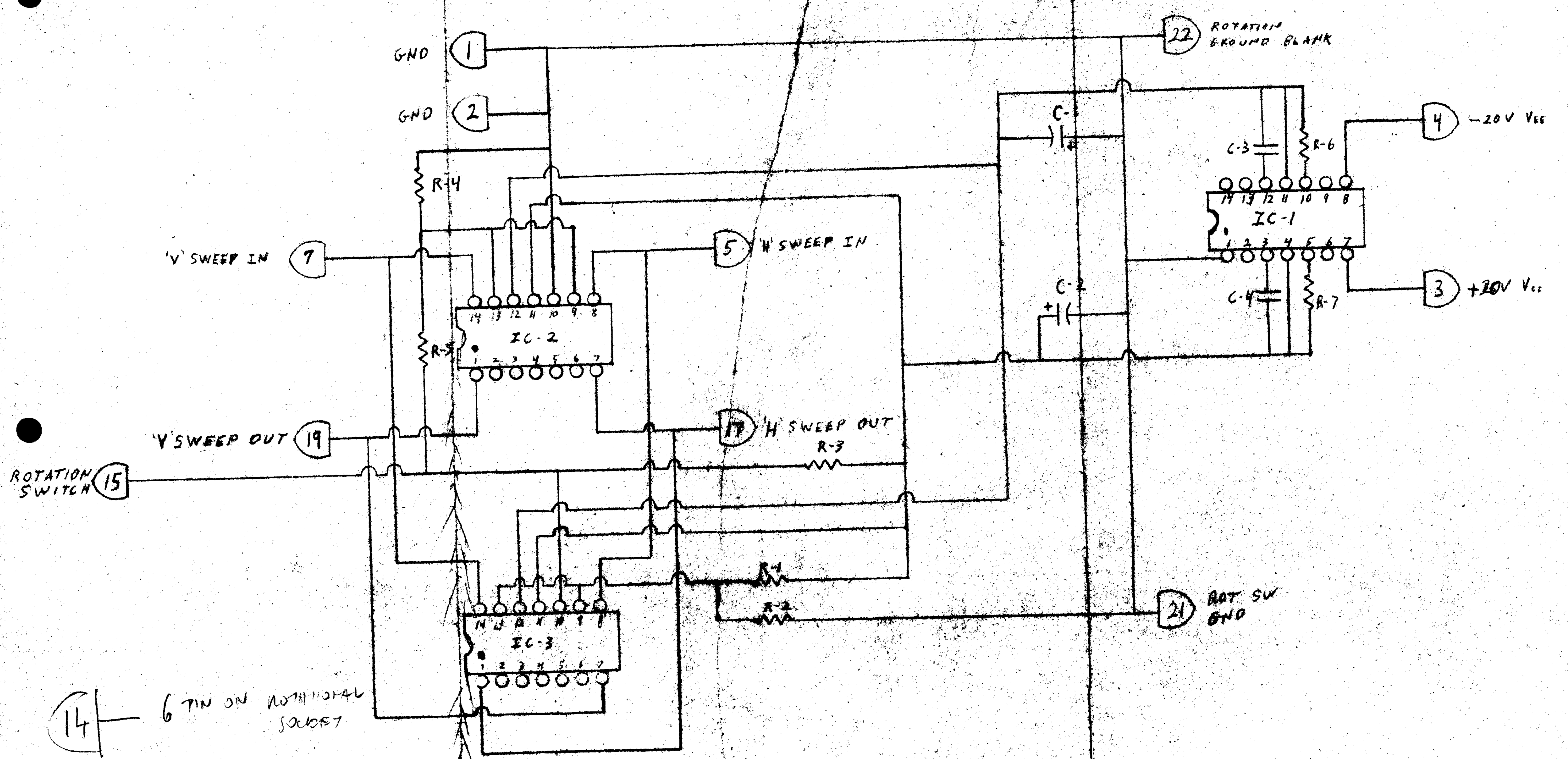
PC-114

+ 50MA
− 10MA

C-1	15µf 20V
C-2	15µf 20V
C-3	.1µf
C-4	.1µf
R-1	2.2K
R-2	4.7K
R-3	1K
R-4	4.7K
R-5	1K
R-6	Dale .5Ω
R-7	" .5Ω
IC-1	SE4501 Regulator
IC-2	AH Fet ~~[illegible]~~
IC-3	" " "

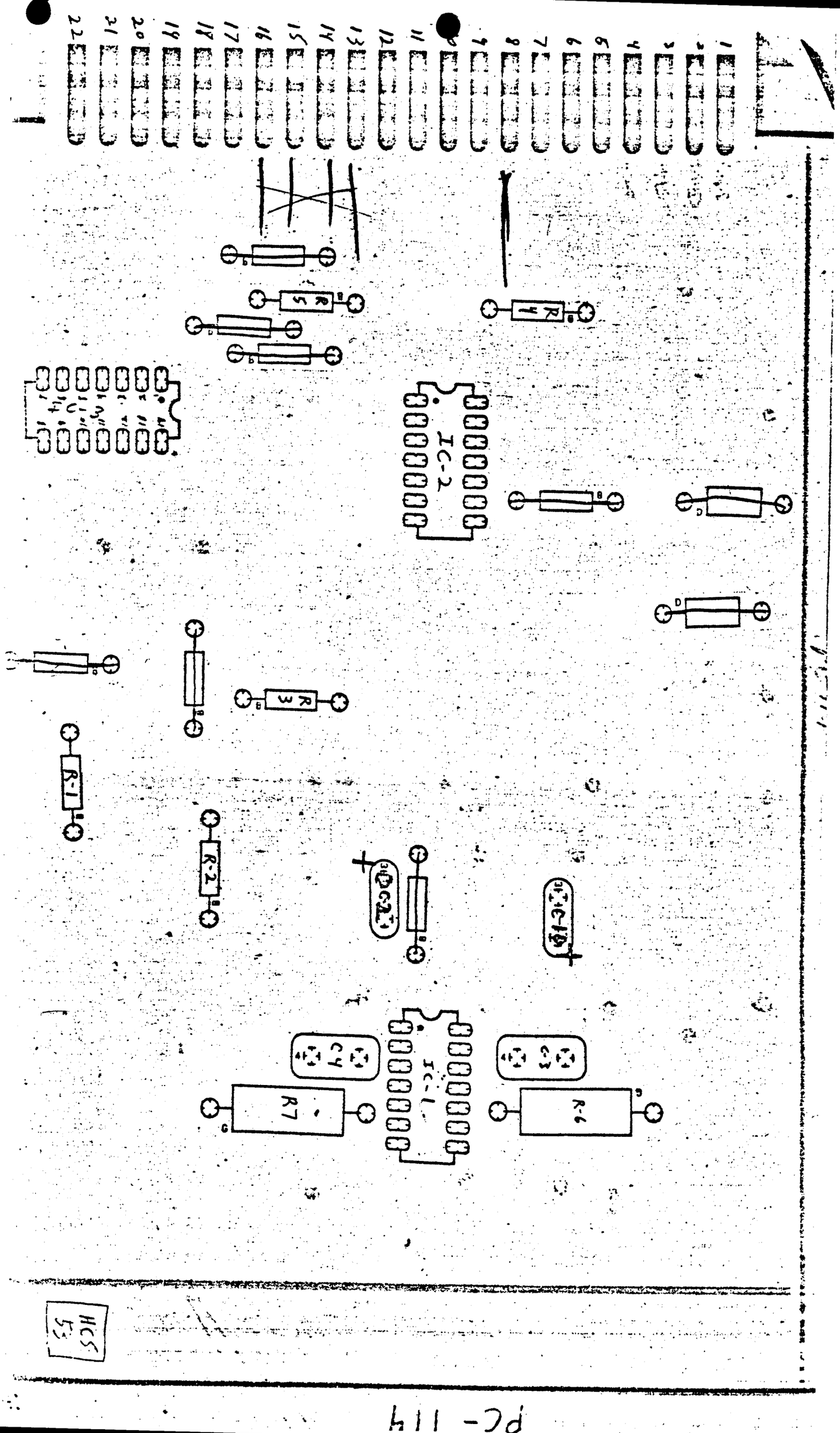
AH0134CD → IC-2, IC-3

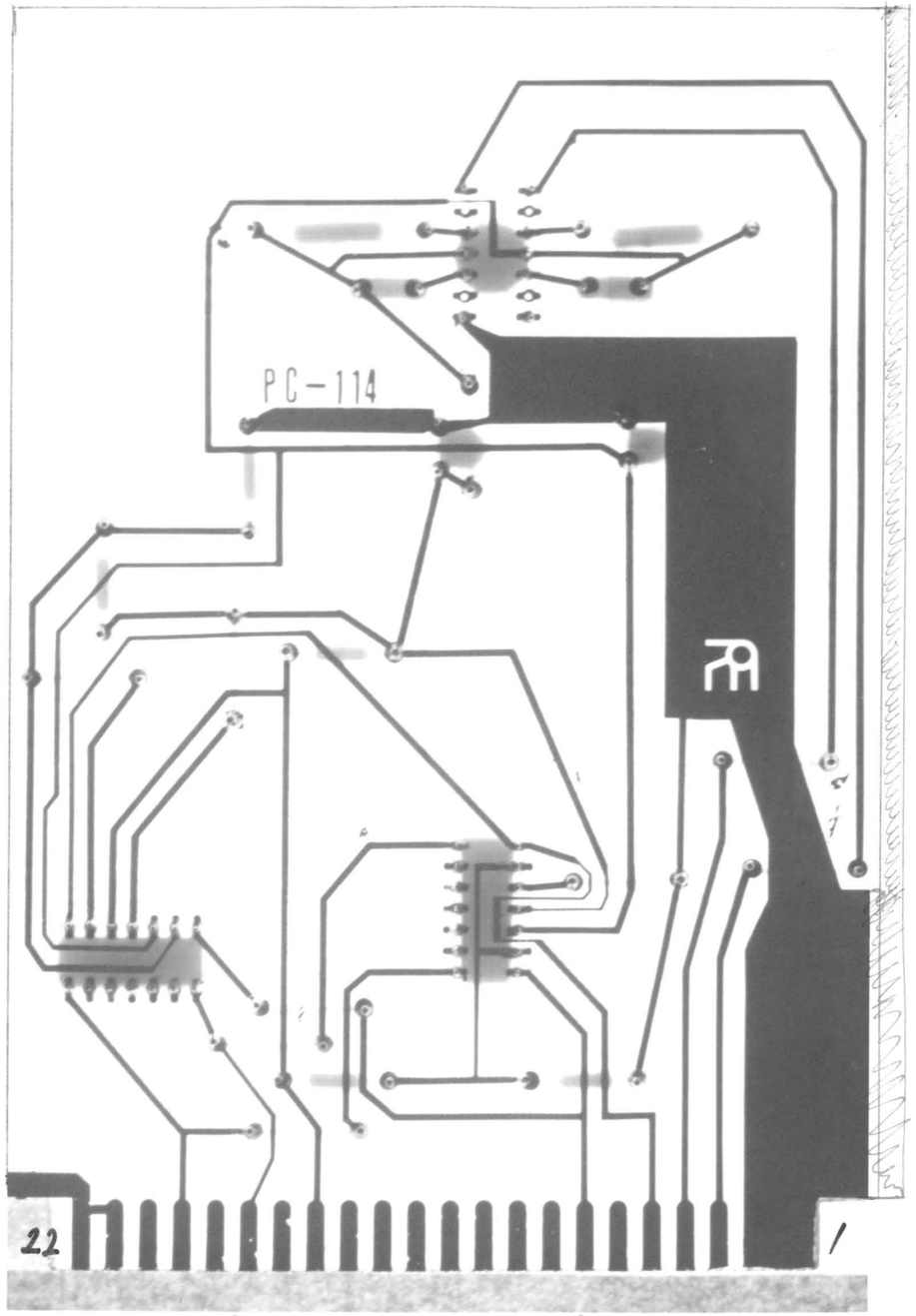
HC5
69

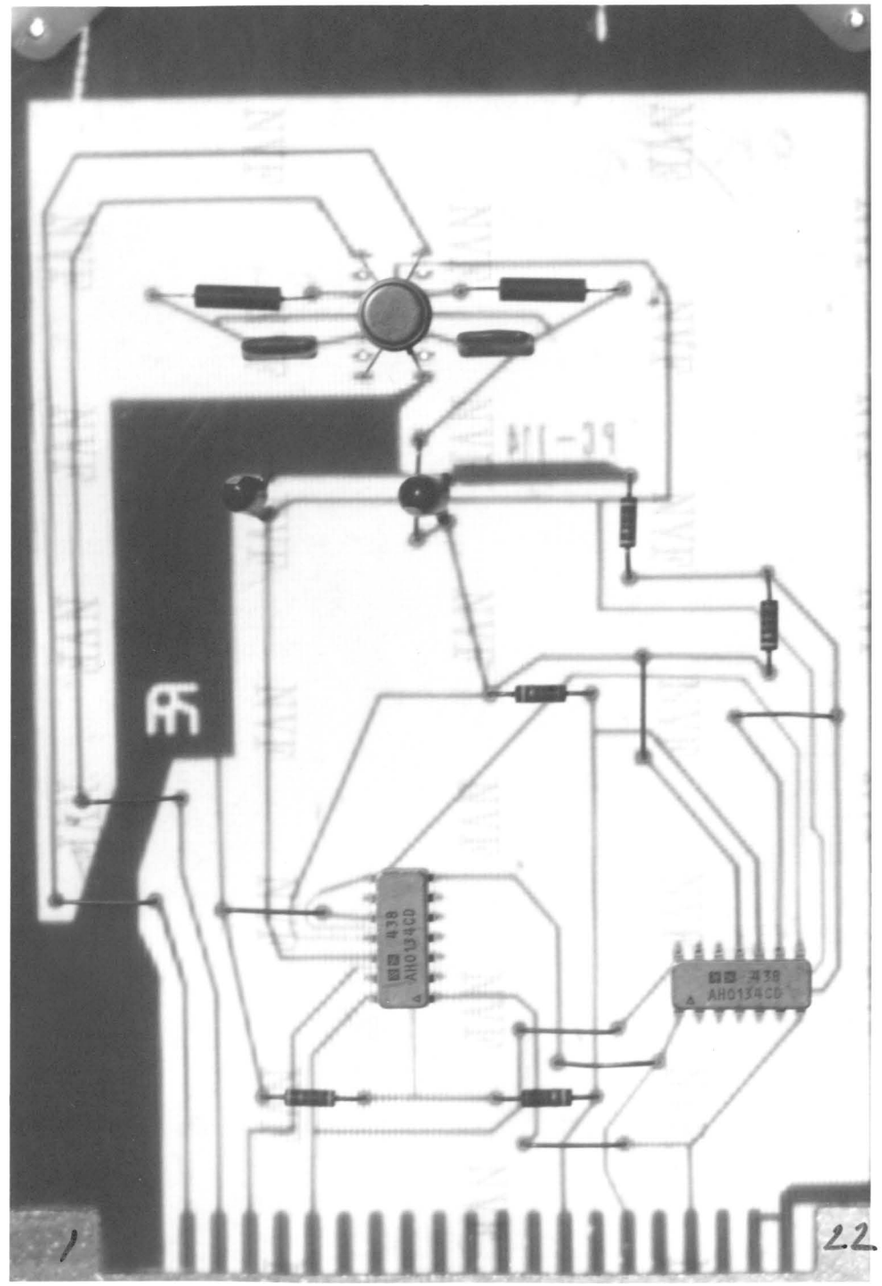

GND
1
GND
2
22
ROTATION GROUND BLANK
4
-20V Vss
3
+20V Vcc
C-1
C-2
C-3
C-4
R-6
R-7
R-4
R-5
IC-1
IC-2
IC-3
'V' SWEEP IN
7
5
'H' SWEEP IN
'V' SWEEP OUT
19
17
'H' SWEEP OUT
R-3
ROTATION SWITCH
15
R-1
R-2
21
ROT SW GND
14
6 PIN ON ROTATIONAL SOCKET
16
2 ON ROT SOCKET

PC-114

PC-114


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
R-1
R-2
R3
R4
R5
R6
R7
C1
C2
C3
C4
C5
C6
C7
IC-1
IC-2


PC-114
22
1


PC-114
AH0134CD
AH0134CD
1
22

PC-115 R

Q-1	NPN ✓
Q-2	NPN ✓
Q-3	NPN ✓
Q-4	NPN ✓
Q-5	NPN ✓
Q-6	NPN ✓
Q-7	NPN ✓
Q-8	P-ch FET ✓
Q-9	NPN ✓
Q-10	P ch fet 2N5462 ✓
Q-11	P ch fet ✓
Q-12	P ch fet "
Q-13	NPN.
Q-14	40409
Q-15	40410 ✓
Q-16	P ch fet "
Q-17	P ch fet "
Q-18	P ch fet "

+75 MA
−20 MA

IC-1	LM 319 COMPARATOR WITH HEAT SINK
IC-3	LM 318 OP-AMP
IC-4	LM 319 COMPARATOR
IC-5	5G4501N REGULATOR ✓
IC-6	LM 318 OP-AMP or N5556 ↑ PREFERRED

D-1	IN914 ✓
D-2	"
D-3	" ✓
D-4	" ✓
D-5	"
D-6	"
D-7	" D-13 9.1 V ZENER
D-8	" D-14 9.1 V ZENER
D-9	"
D-10	"
D-11	"
D-12	"

C-1	100PF ✓
C-2	100PF ✓
C-3	100 PF ✓ .001 ✓
C-4	100PF ✓
C-5	.001 ✓ (100PF) .001 ✓
C-6	100P ✓
C-7	.1 µF CER ✓
C-8	.1 Cer ✓
C-9	.1 Cer ✓
C-10	.1 Cer ✓
C-11	.1 Cer ✓
C-12	.01 MYL
C-13	100P ✓
C-14	.1 ✓
C-15	5PF ✓
C-16	.1 µF Cer ✓
C-17	.1 Cer ✓
C-18	.1 Cer ✓
C-19	15+20V TAN ✓
C-20	15µ 20V Tant
C-21	.1 µF Cer
C-22	.1 µF Cer
C-23	.1 Cer ✓
C-24	10 µF 25V
C-25	10 µF 25V ✓
C-26	100P ✓
C-27	.1
C-28	.1 Cer
C-29	.1 Cer
C-30	.1
C-31	15µ 20V Tant
C-32	15µ 20V Tant
C-33	.1 µF

R-1	100K ✓
R-2	5.6K 2.2K
R-3	4.7K ✓
R-4	2.2K ✓
R-5	2.2K ✓
R-6	15K ✓
R-7	15K ✓
R-8	15K ✓
R-9	15K ✓
R-11	27K 100K ✓
R-12	2.2K ✓
R-13	2.2K ✓
R-14	50K 47K ✓
R-15	50K 47K ✓
R-16	120K ✓
R-17	150K ✓
R-18	50K 47K ✓
R-19	50K 47K ✓
R-20	4.7 K ✓
R-21	10.7K ✓
R-24	50K 47K ✓
R-26	15K ✓
R-27	15K ✓
R-28	15K ✓
R-29	8.2K ✓
R-30	8.2K ✓
R-31	50K 47K ✓
R-32	1K ✓
R-33	1K ✓
R-34	6.8K ✓
R-35	75Ω ✓
R-36	10K ✓
R-37	75Ω ✓
R-38	15K ✓
R-39	15K ✓
R-40	15K ✓
R-41	50K 47K ✓
R-42	50K 47K ✓
R-43	20K POT ✓
R-44	20K POT ✓

R47	75Ω ✓
R48	.5Ω ✓
R49	.5Ω ✓
R50	33K ✓
R51	15K ✓
R52	15K ✓
R53	15K ✓
R54	15K ✓
R59	75Ω ✓
R60	6.8K ✓
R61	100K
R62	1

J-1	
J-2	
J-3	
J-4	
J-5	

R-22 SET TP-1 FOR 150 mA + PULSE WITH DUAL TRACE INPUT OPEN & SECTION POT INPUT BETWEEN +3 & +7 VOLTS

R-43 SET TP-2 TO +10V +.4V −0

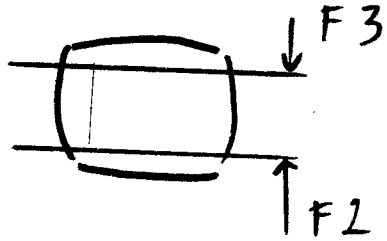
R-44 SET TP-3 TO −10V +0 −.4V

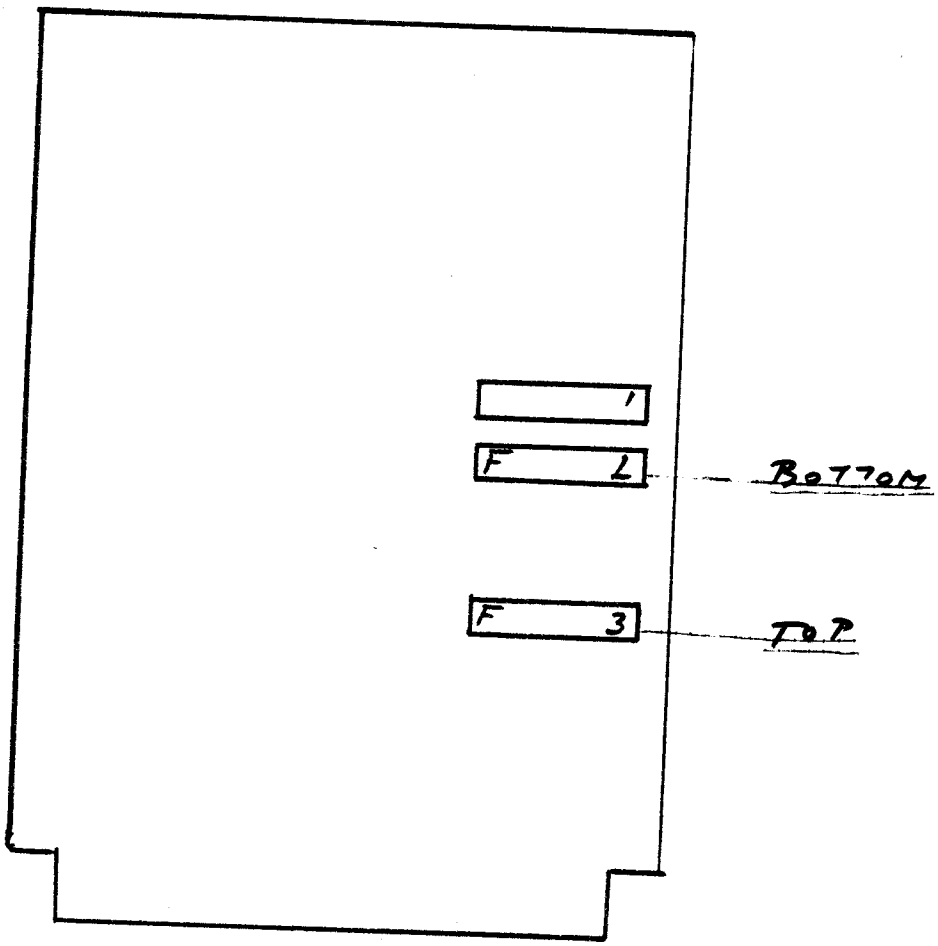
HCS 40

* ADD 1 MEG RESISTOR BETWEEN PIN 1 & TC-1

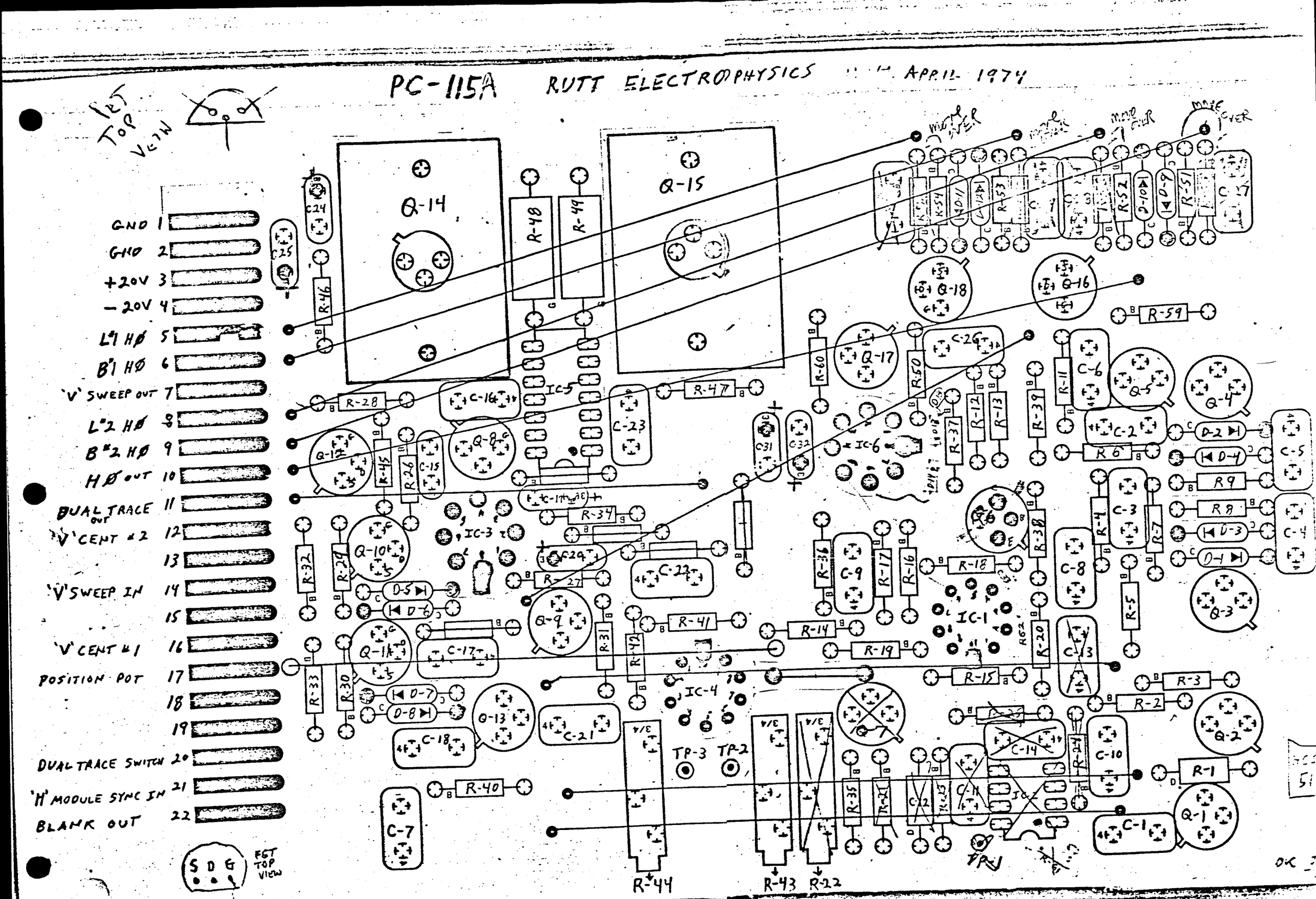
VERTICAL CENTER
TOP/BOTTOM BLANKING ADJ.

PC 115





PC-115A RUTT ELECTROPHYSICS 1st APRIL 1974



DUAL TRACE SWITCH (20)

MODULE SYNC IN (21)

C-1

R-1

R-2

R-3

Q-1

Q-2

C-7

R-5

C-2

R-6

D-3

R-8

Q-3

D-1

D-2

R-4

C-3

R-7

C-6

R-11

Q-4

R-9

D-4

Q-5

R-12

R-13

R-39

R-40

Q-13

C-4

C-5

11 DUAL TRACE OUT

R-37

Q-6

R-38

R-20

C-10

R-15

Ic-1

R-17

R-16

C-8

R-18

R-19

R-27

Q-10

Q-8

R-26

C-15

12 'V' CENT #2

R-32

R-29

C-17

D-5

D-6

Q-11

16 'V' CENT #1

R-33

R-30

C-18

D-7

D-8

IC-3

R-34

C-19

C-20

14 V SWEEP IN

R-28

R-31

Q-9

R-45

7 'V' SWEEP OUT

R-41

R-42

C-22

TP 2

R-43

IC-4

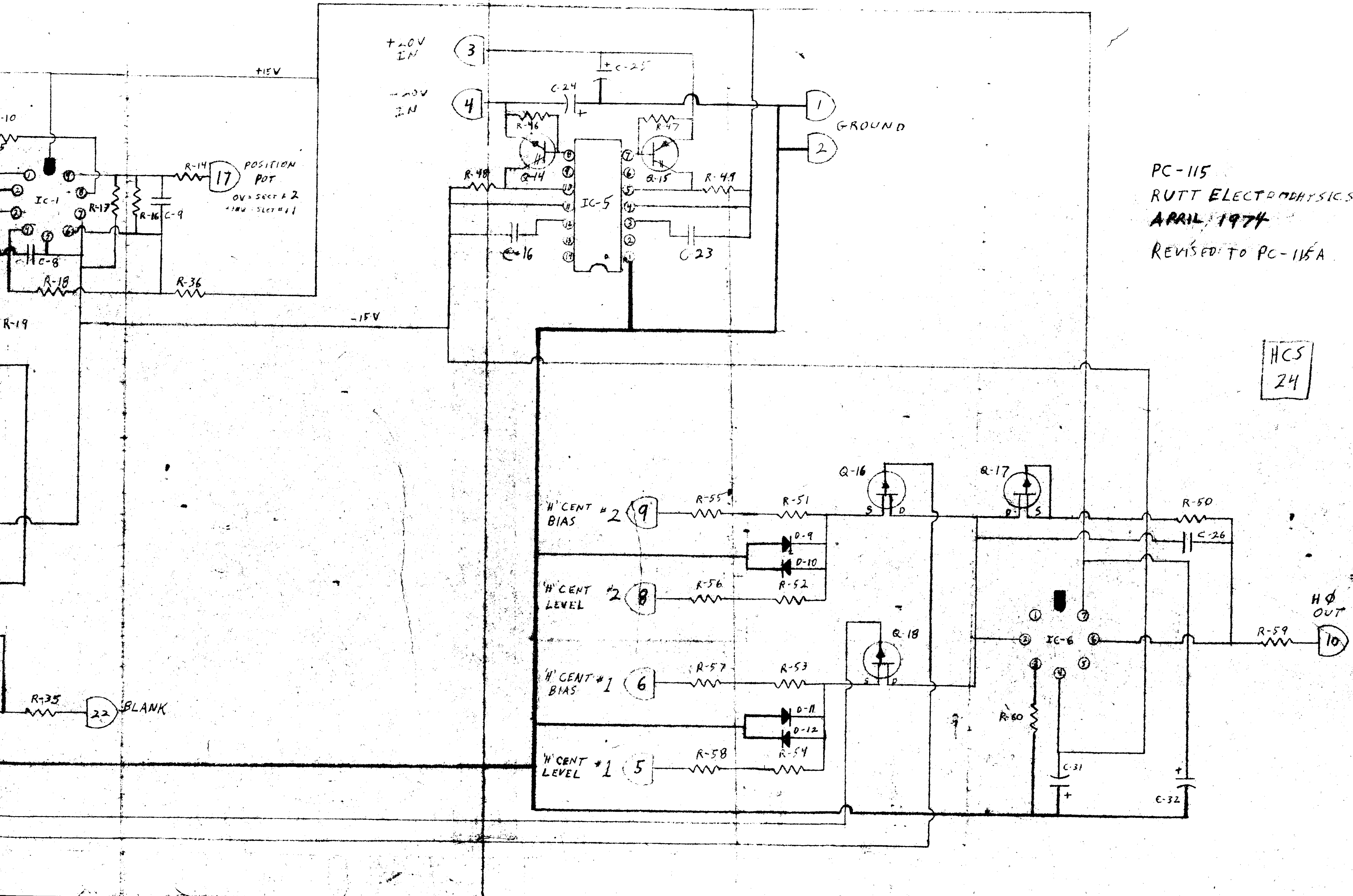
R44

R-35

22 BLANK

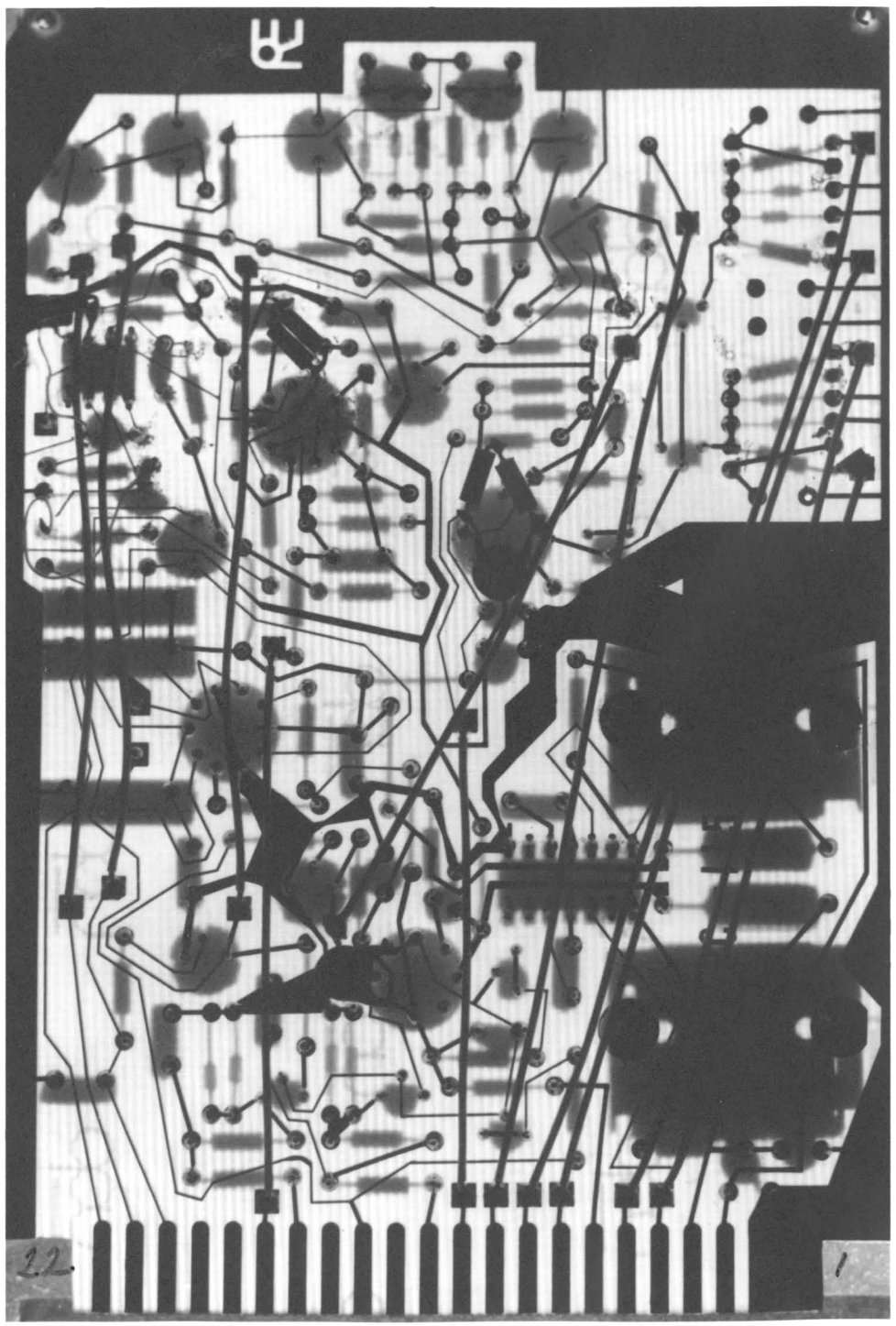
C-21

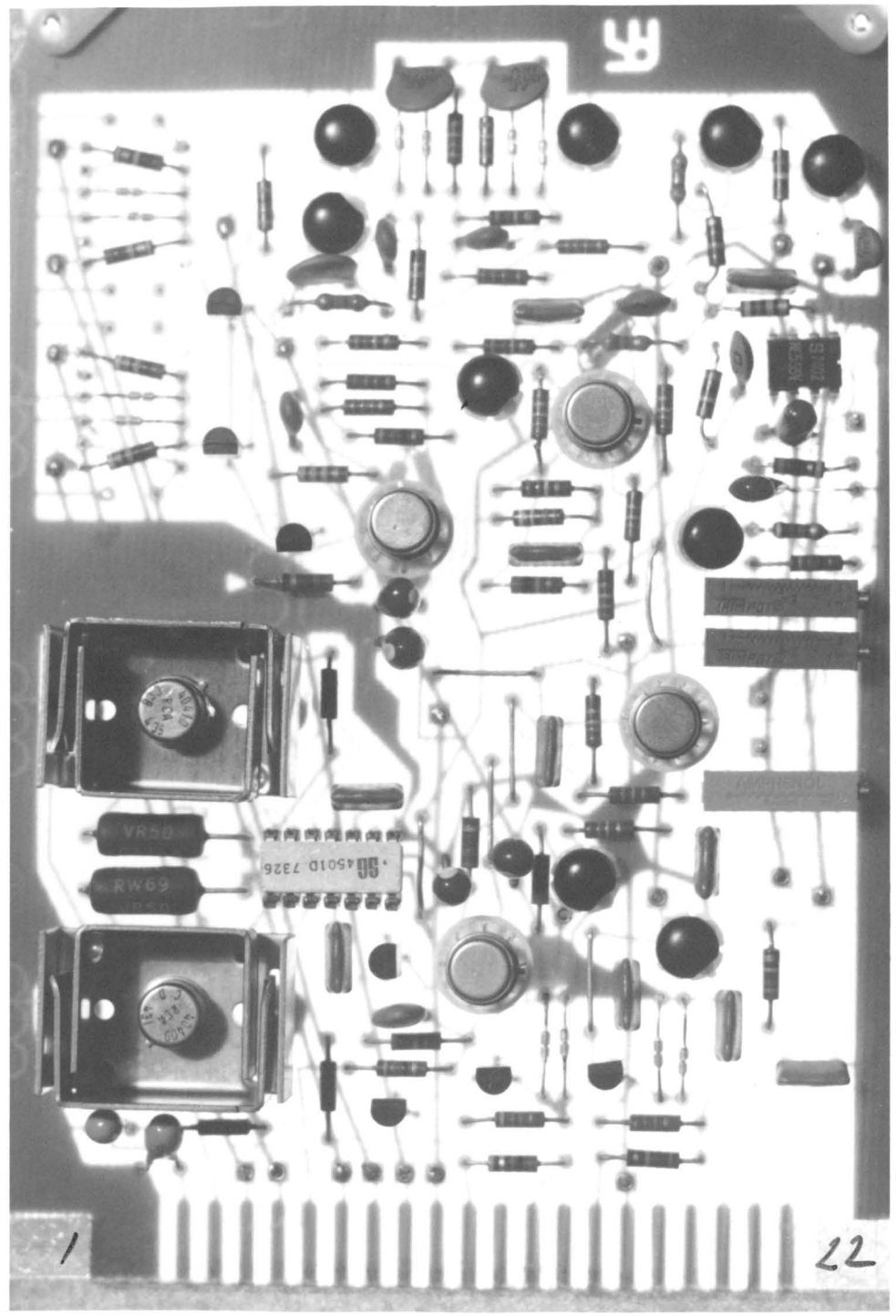
3 TP



PC-115
RUTT ELECTROPHYSICS
APRIL, 1974
REVISED TO PC-115A

HCS 24


22
1


VR50
RW69
1
22

TRONOTEC, INC.
Church Road Laboratory
Franklin, New Jersey

PARTS LIST

DATE 12/5/75 PROJECT RE 4½ ASSY ~~(DCU)~~ DISPLAY PC-116A DRAWING _____ SHEET 1 OF _____

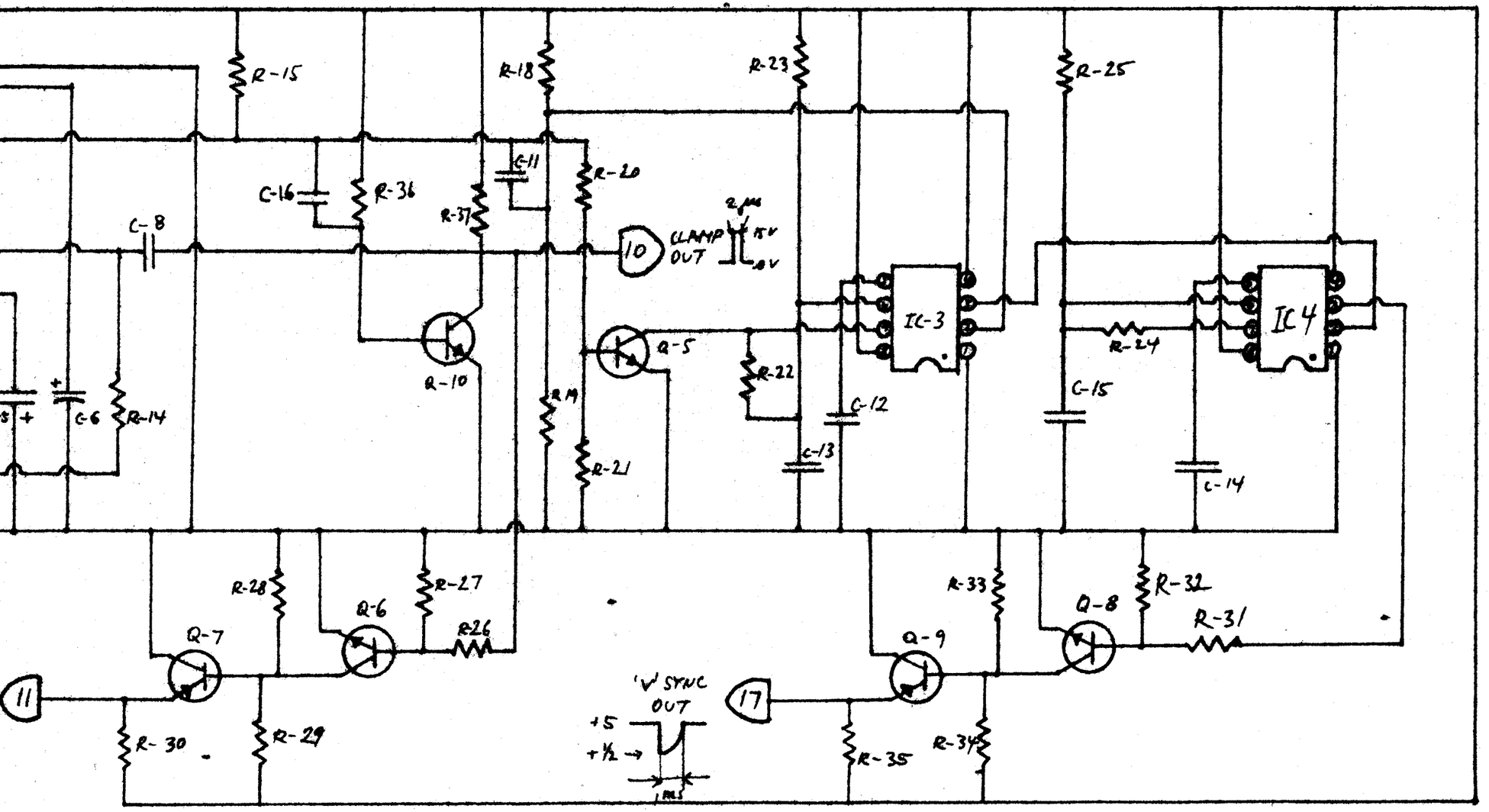
REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PN	QTY	UNIT	PRICE	TOTAL
IC1	COMPARATOR	LM311	NSC		1			
IC 3,4	TIMER	NE555V	SIG		2			
Q1,3,5,6, 8,10	NPN	2N3568			8			
Q2,7,9	PNP	2N3638A			3			
Q4	FET	2N4091			1			
D1,2	DIODE, SILICON, SIGNAL	1N914			2			
C1,3,5,6	Capacitor, Elect-Tant 15µF/20V				4			
C2,4,12, 14,15	" , Ceramic .1µF				5			
C7	" " 10pF				1			
C8	" Mylar 10nF				1			
C11	" Ceramic 100pF				1			
C13	" " 470pF				1			
C16	" " 220pF				1			
C17	" " 5pF				1			
R1,21,30, 32,35,27	Resistor - ¼W, 5% 1KΩ				6			
R2	" 270K				1			
R3	" 47K				1			

Franklin, New Jersey

PARTS LIST

DATE 12/5/75 PROJECT RE 4½ ASSY PC 116A (DCU) DRAWING _____ SHEET 2 OF ____

REF	DESCRIPTION	MFR PART NR.	MFR.	TRONOTEC PN	QTY	UNIT	PRICE	TOTAL
R4,5,7	Resistor ¼W-5% 2K				4			
R6,18,20	" 10K				6			
R8	" 1MΩ				1			
R9	" 27K				1			
R10	" 4.7K				1			
R11,13	" 470Ω				2			
R12	" 27Ω				1			
R14,	" 100K				1			
R19,23	" 18K				2			
R22,24	" 75K				2			
R28,33	" 2.7K				2			
R29,34	" 5.1K				2			
R36	" 33K				1			
R37	" 2.2K				1			



PC-116

RUTT ELECTROPHYSICS

APR 1974

MODFIED TO 116A

TOP VIEW
G S
D

+15V (2)(12)

VIDEO IN (5)

R-1 C-1 R-2 R-3 R-4 R-5 R-6 C17 R-7

Q-1 Q-2

C-2 R-4 R-10

Q-3 R-8

Q-4 C-7 D-2

R-11 C3 R-12 R-13 C-4 C-5 C-6 R-14

R-15 C-8

C-16 R-36 R-37 C-11 R-18 R-20

(10) CL OU

Q-5 R-10 R19 R-21

-15V (9)

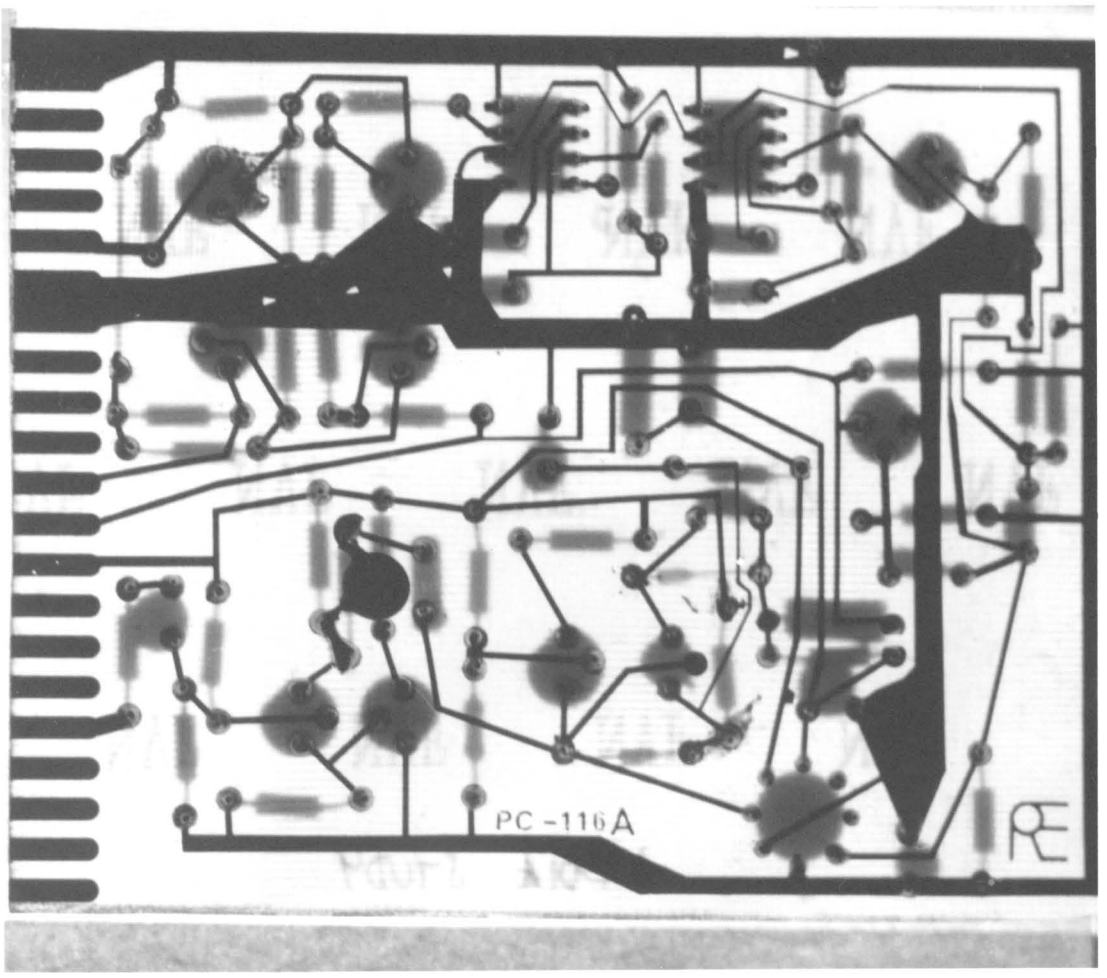
GND (5)(6)

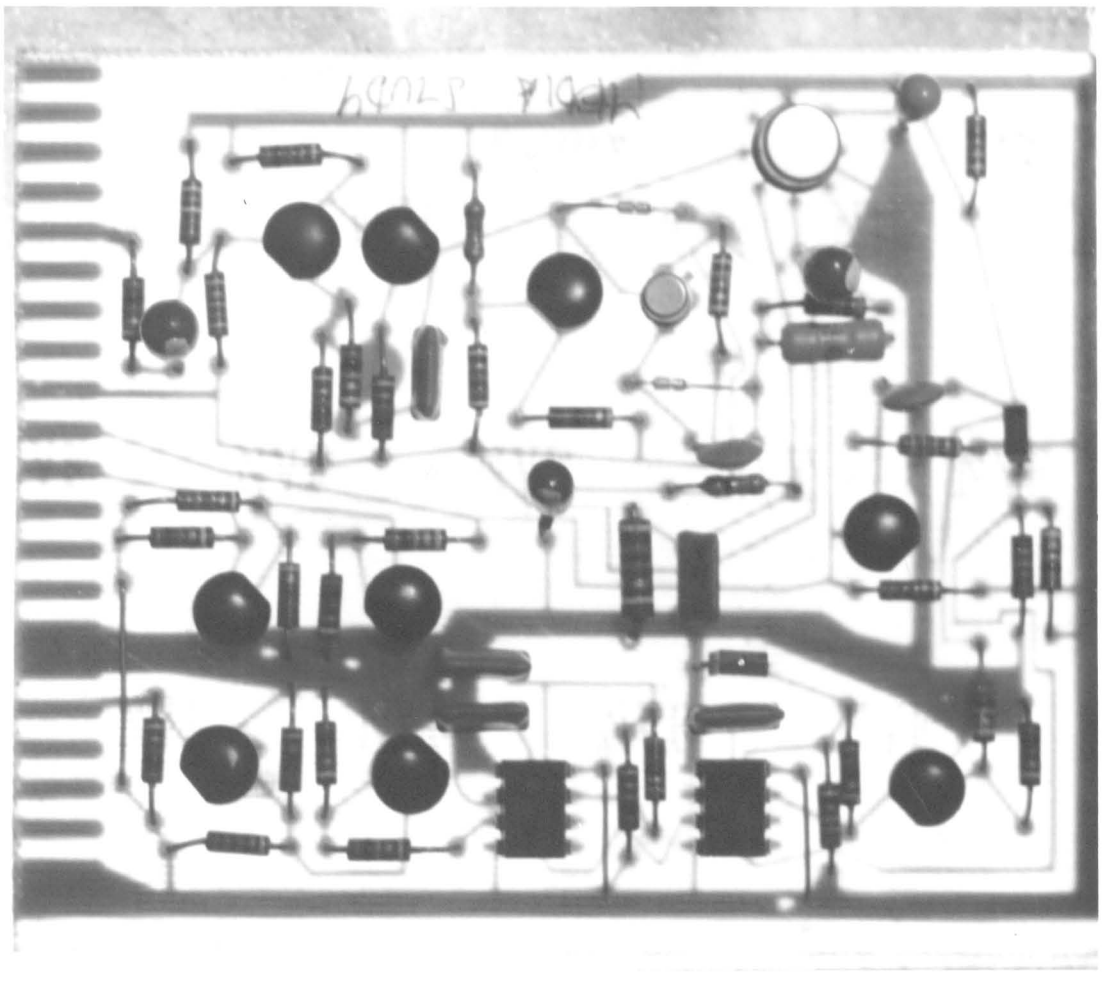
R-28 R-27 Q-6 Q-7 R26 R-30 R-29

(11)

'H' SYNC OUT
+5
+½
4 μsec

'V' SYN OUT
+5
+½
1 mS


PC-116A



Q-1	FET · 5462
Q-2	FET
Q-3	FET
Q-4	NPN — 3568
Q-5	PNP — 3638
Q-6	NPN — 3568
Q-7	40409
Q-8	40410
Q-9	FET
Q-10	FET

+50 MA
−20 MA

D-1	1N914
D-2	"
D-3	9.1V ZENER
D-4	1N914
D-5	"
D-6	"
D-7	"

IC-1	LM 318 OP-AMP
IC-3	LM 318 OP-AMP
IC-4	SG4501N REGULATOR
IC2	MC1494 DIP

C-1	.1 Cer
C-2	.1 Cer
C3	15µf 20V
C-4	5PF
C-5	15µf 20V
C-6	15µf 20V
C-7	15µf 20V
C-8	15µf 20V
C9	5PF
C-10	100PF
C-11	10µf 25V
C-12	10µf 25V
C-13	.1µf Cer
C-14	.1µf Cer
C15	.1

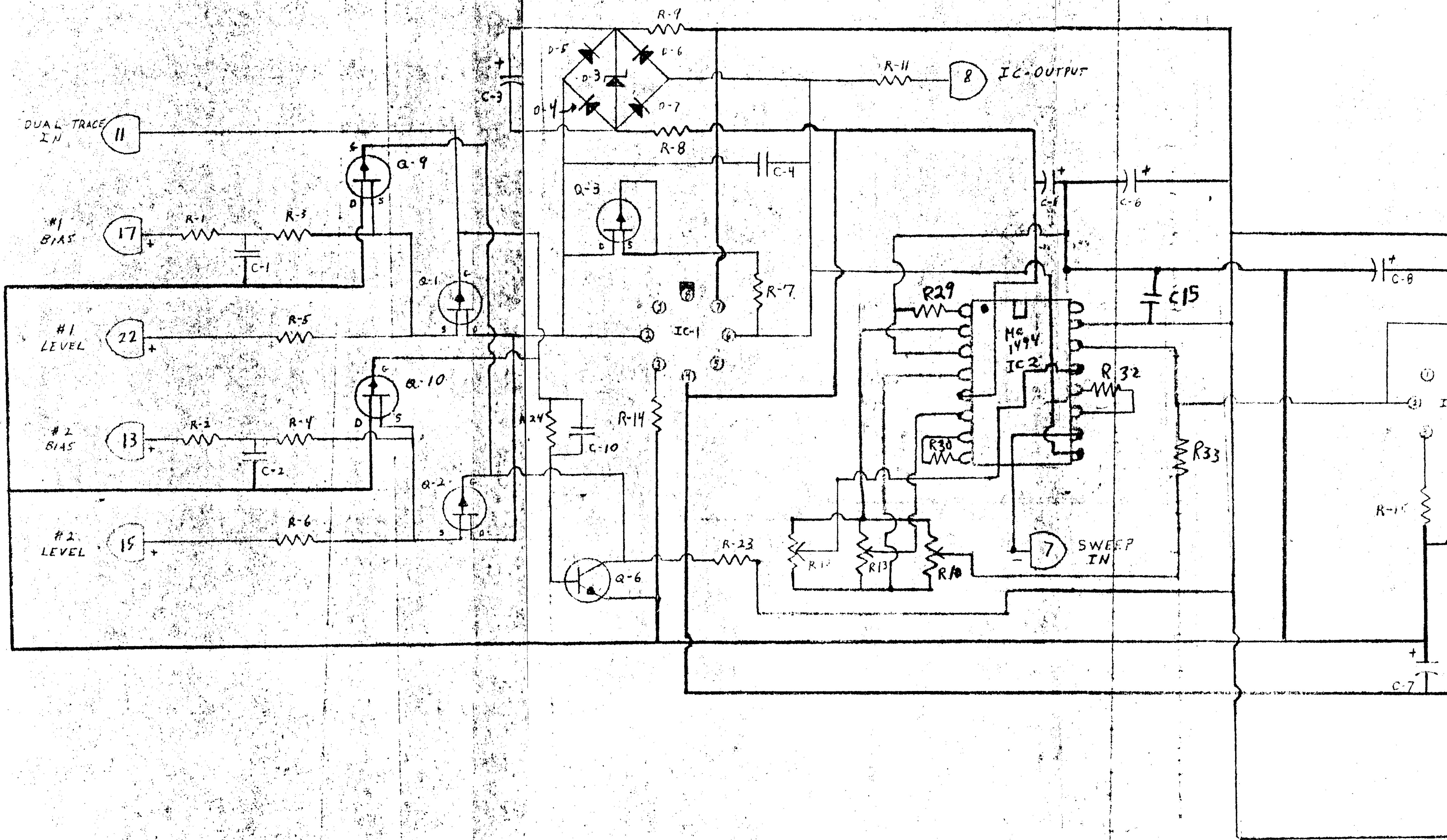
R-1	510Ω
R-2	510Ω
R-3	4.7K
R-4	4.7K
R-5	4.7K
R-6	4.7K
R-7	10K
R-8	15K
R-9	15K
R-10	5K POT (20K)
R-11	1K
R-12	20K POT
R-13	20K POT
R-14	2.7K
R-15	10K
R-16	10K pot
R-17	10K
R-18	10K
R-19	4.7Ω
R-20	4.7Ω
R-21	75Ω
R-22	75Ω
R-23	10K
R-24	33K
R-25	75Ω
R-26	75Ω
R-27	.5Ω DALE
R-28	.5Ω DALE
R29	125
R30	27K
~~R31~~	~~1K~~
R32	15K
C33	47K

WHERE IS

R-10 OUTPUT OFFSET
R-12 X_0
R-13 Y_0
R-16 SCALE FACTOR

PC-117

HCS 39



DUAL TRACE IN
11
#1 BIAS
17
#1 LEVEL
22
#2 BIAS
13
#2 LEVEL
15
R-1
R-3
C-1
R-5
R-2
R-4
C-2
R-6
Q-9
Q-1
Q-10
Q-2
C-3
D-5
D-6
D-3
D-4
D-7
R-9
R-8
R-11
8
IC-OUTPUT
C-4
Q-3
R-7
IC-1
R24
C-10
R-14
Q-6
R-23
R29
MC 1494
IC 2
R 32
R30
R33
C15
C-6
C-8
R13
R10
7
SWEEP IN
C-7

PC-117B

RUTT ELECTROPHYSICS

APRIL 1974

FET

S G D

R-11 — 8 IC-OUTPUT

C-4 — R-7

C-5 — C-6 — C15

R29 — MC 1494 IC2 — R32 — R33

R30

R23 — R12 — R13 — R10 — 7 SWEEP IN

C-8 — C-9 — IC-3

R-16 — R-17

D-1 — Q-4 — R-19 — R-21 — 6 OUTPUT TO P. 114

D-2 — Q-5 — R-20 — R-22 — 5 OUTPUT TO ROTATING MODULE

R-15 — R-18

C-7

GROUND

GROUND

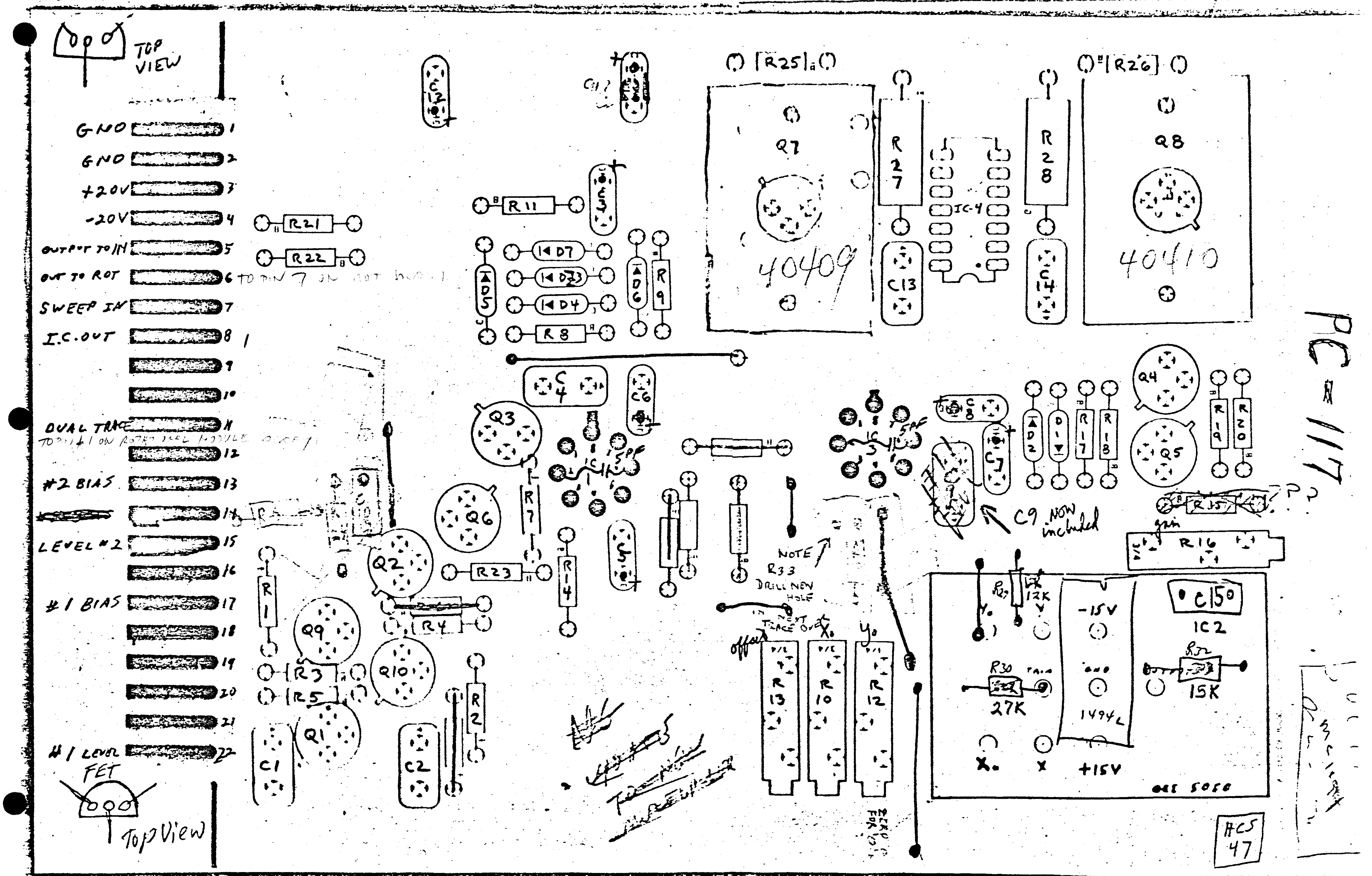
-20V — C-11 — C-12 — +20V

R-25 — Q-7 — Q-8 — R-26

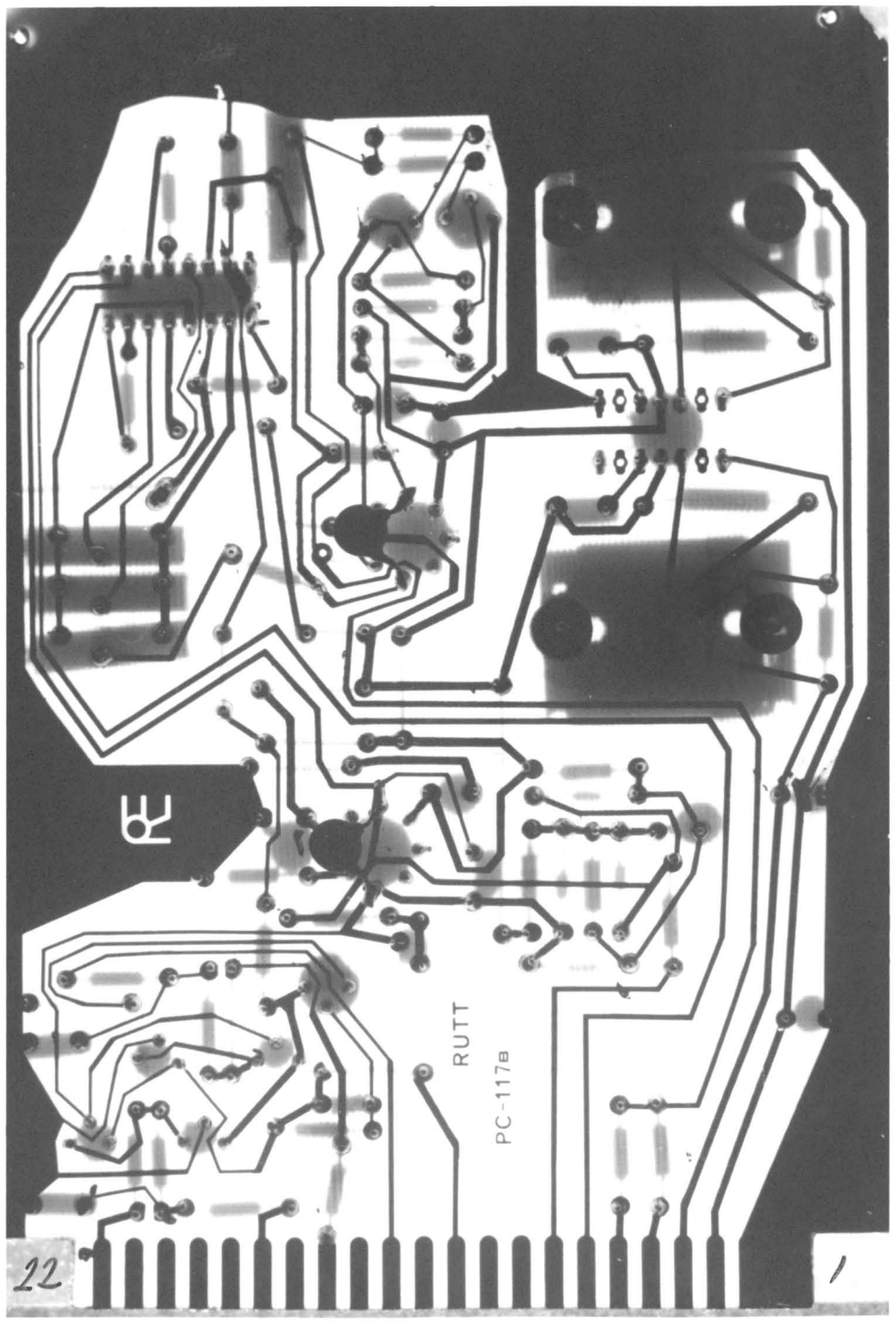
R-27 — R-28

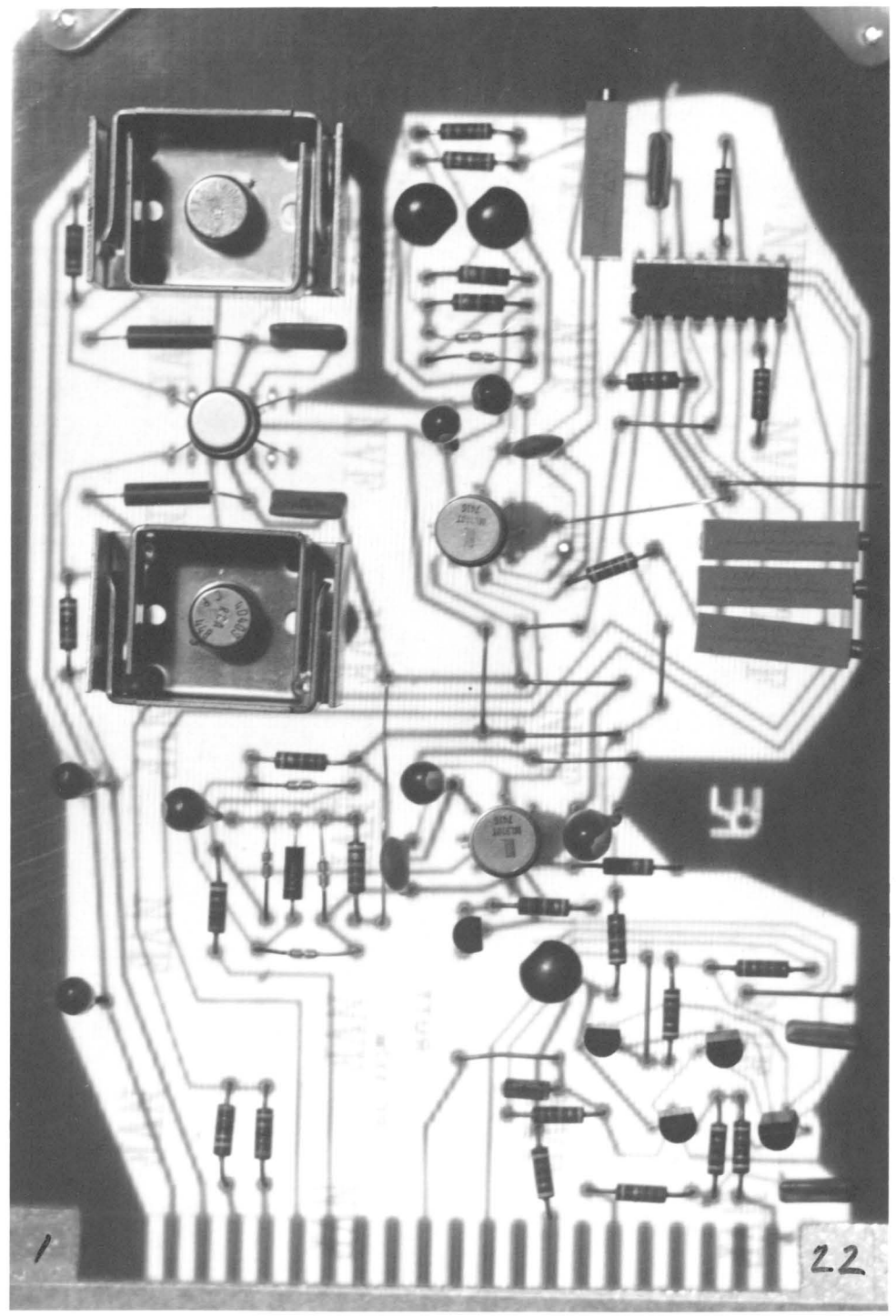
IC-4 — C-14

HCS 22



TOP VIEW
GND 1
GND 2
+20V 3
-20V 4
OUTPUT TO IN 5
OUT TO ROT 6 TO PIN 7 ON ROT
SWEEP IN 7
I.C. OUT 8
9
10
DUAL TRACE 11
12
#2 BIAS 13
14
LEVEL #2 15
16
#1 BIAS 17
18
19
20
21
#1 LEVEL 22
FET
Top View
R21
R22
R11
D7
D4
D5
D6
R9
R8
C3
C4
C6
Q3
Q6
Q2
Q9
Q10
Q1
C1
C2
R1
R3
R5
R4
R2
R7
R14
R23
C5
IC
5PF
R25
R26
Q7
Q8
40409
40410
R27
R28
IC-4
C13
C14
Q4
Q5
C8
C7
D2
D1
R17
R18
R19
R20
R15
R16
gain
C9 NOW included
NOTE R33 DRILL NEW HOLE
NEXT TRACE OVER
offset
X0
Y0
R13
R10
R12
ZERO FOR
12K
-15V
IC2
R30
27K
GND
1494L
R32
15K
X0
X
+15V
PC-117
ACS 47


RUTT
PC-117B
22
1


1
22

PC-118 AB

IC-1	LM318
IC-2	MC1494 DIP
IC-3	SG-4501

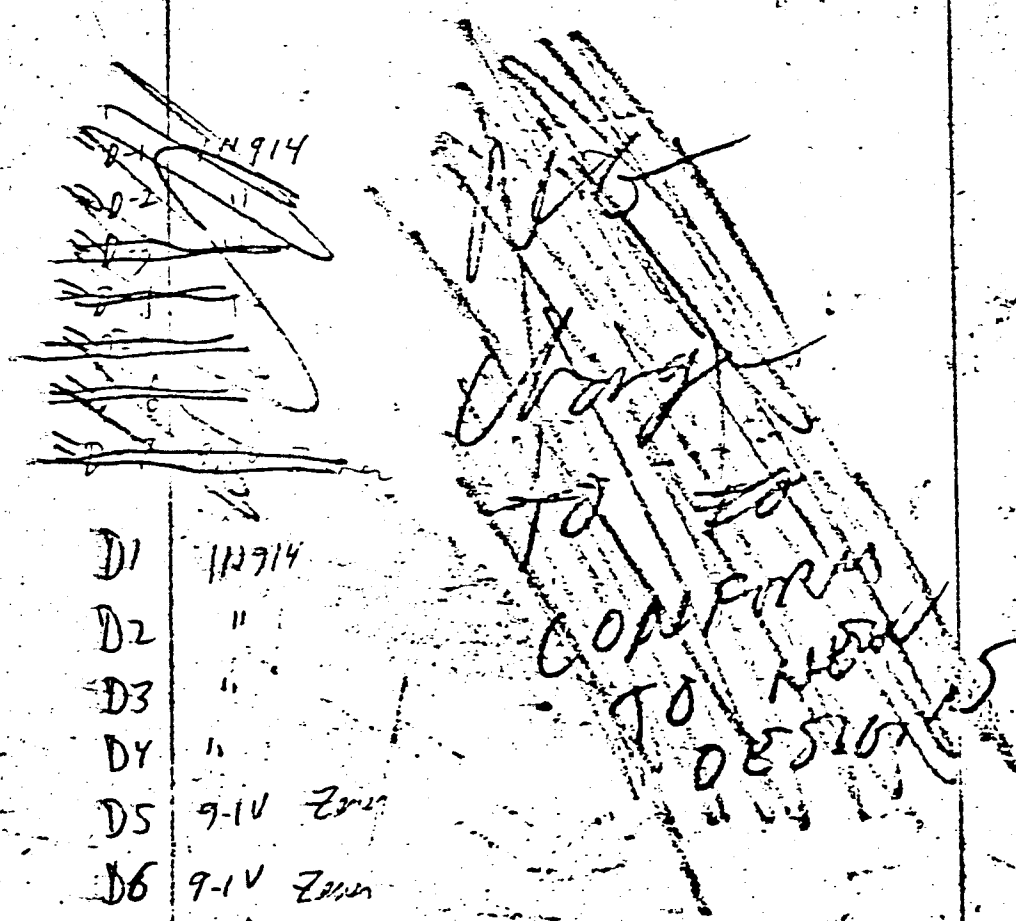
+50 MA
−15 MA

Q-1	40409
Q-2	40410
Q3	NPN 3569
Q-4	PNP 3638
Q-5	FET 2N5462
Q-6	FET "
Q-7	FET "
Q-8	FET "
Q-9	NPN 3568

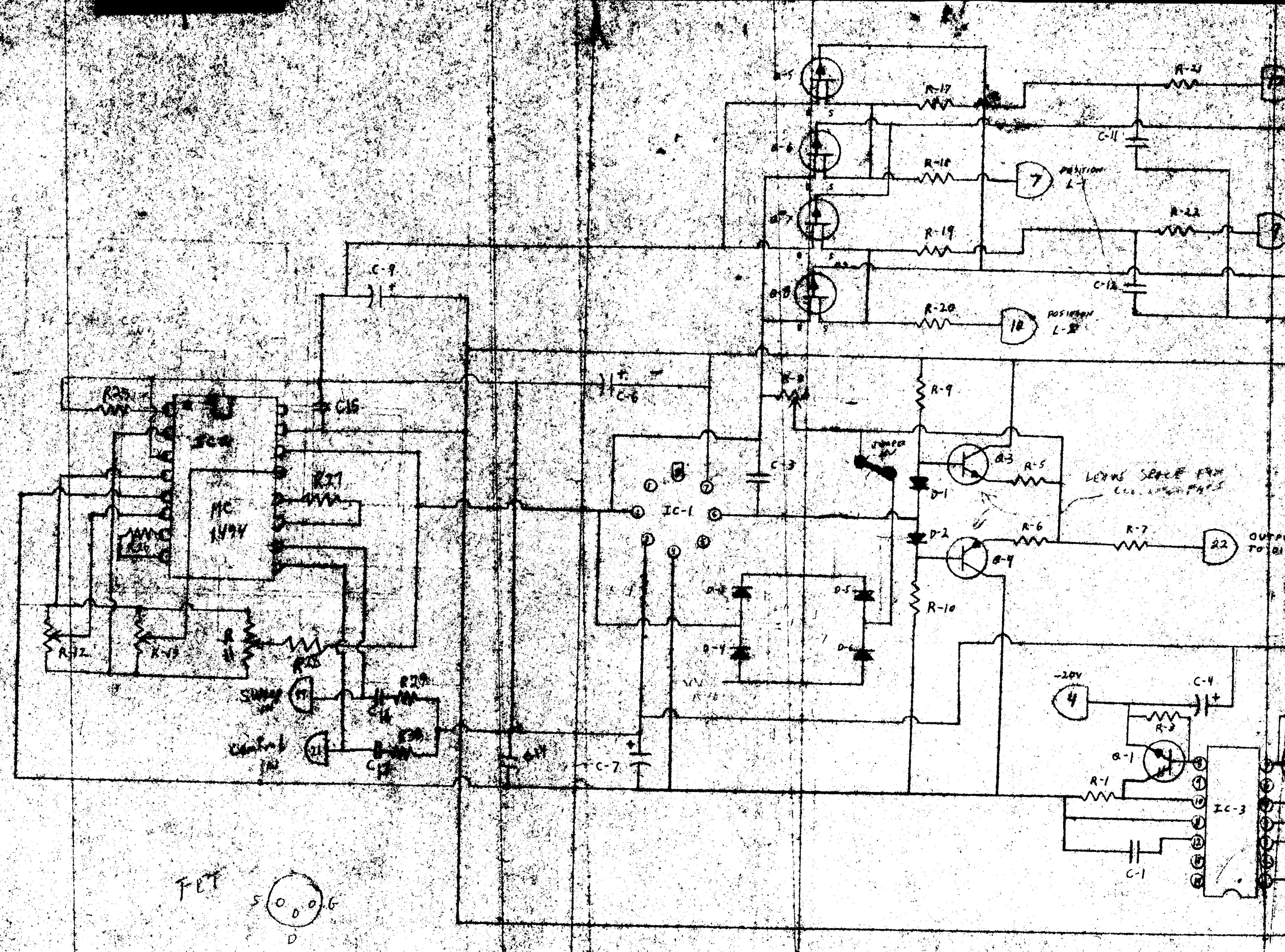
C-1	.1 µf 6v
C-2	.1 µf 6v
→ C-3	5PF
6.8/35V C-4	10µf 25V TAN
6.8/35V C-5	10µf 25V TAN
C-6	15µf 20V TAN
C-7	"
C-8	"
C-9	"
C-10	.1µf 6v
C-11	.1µf 6v
C-12	.1µf 6v
C-13	100PF
C14	.1 Ceramic
C15	.1 Ceramic
C16	10pf
C17	10pf

R-1	.5Ω DALE
R-2	.5Ω DALE
R-3	75Ω
R-4	75Ω
R-5	4.7Ω
R-6	4.7Ω
R-7	75Ω
R-8	100K POT
R-9	10K
R-10	10K
R-11	5K POT (20K)
R-12	20K POT
R-13	20K POT
R-14	10K
R-17	4.7K
R-18	4.7K
R-19	4.7K
R-20	4.7K
R21	560Ω
R22	560Ω
R 23	100K
R-24	10K
R25	15K
R26	
R27	
R28	47K
R29	510Ω
R30	510Ω
R26	27K
R27	15K

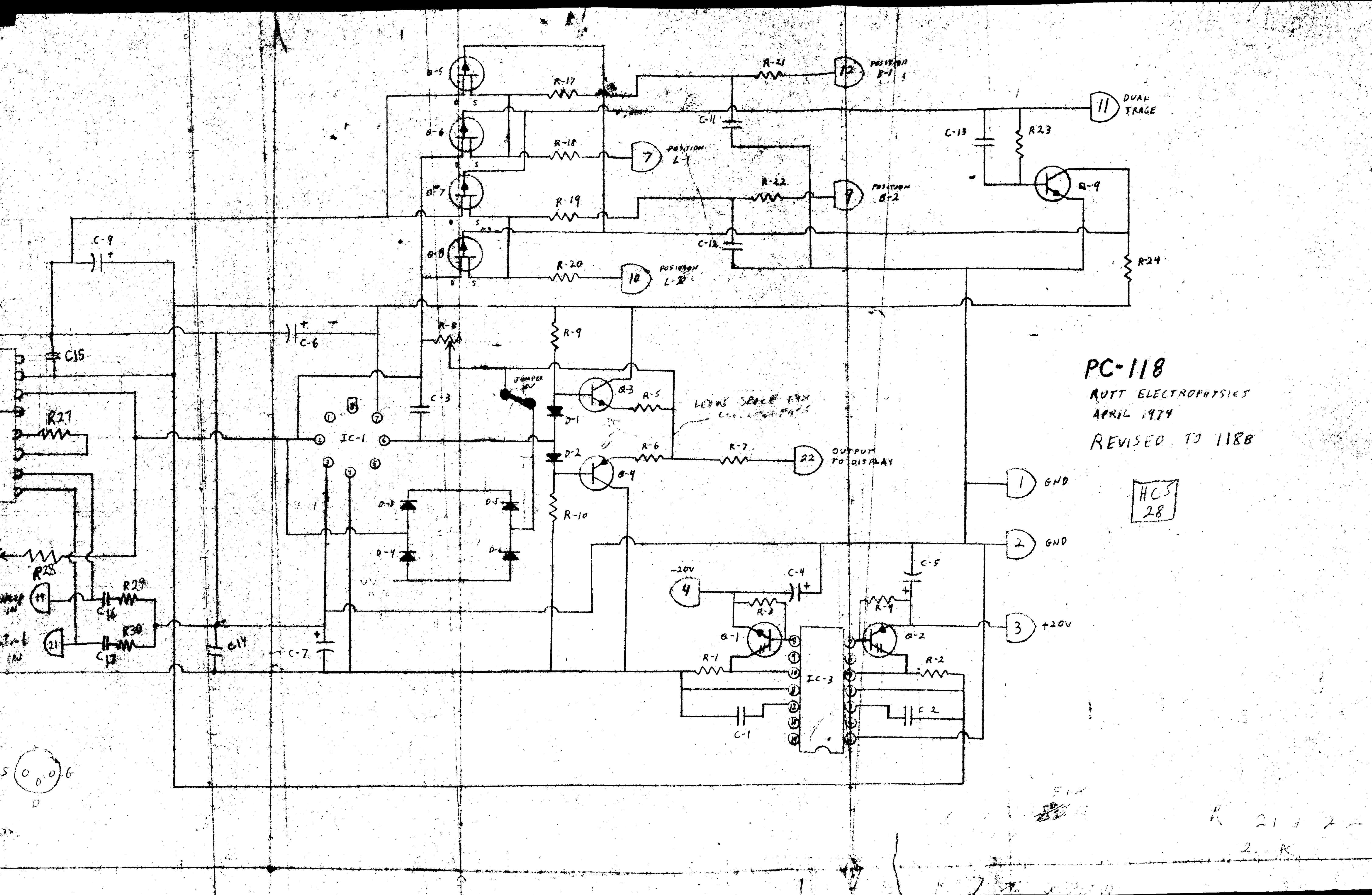
D1	1N914
D2	"
D3	"
D4	"
D5	9.1V Zener
D6	9.1V Zener



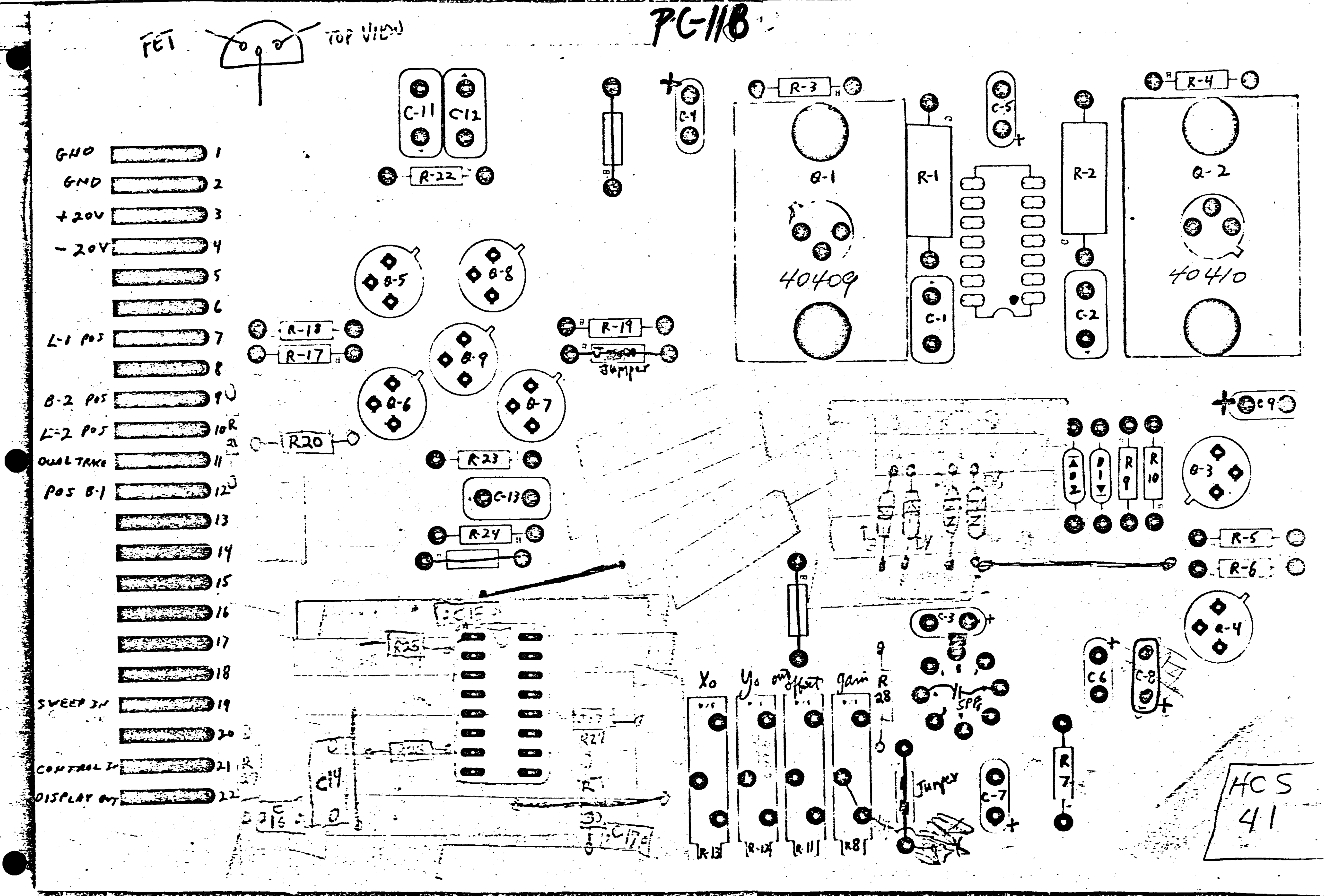
HC5
68



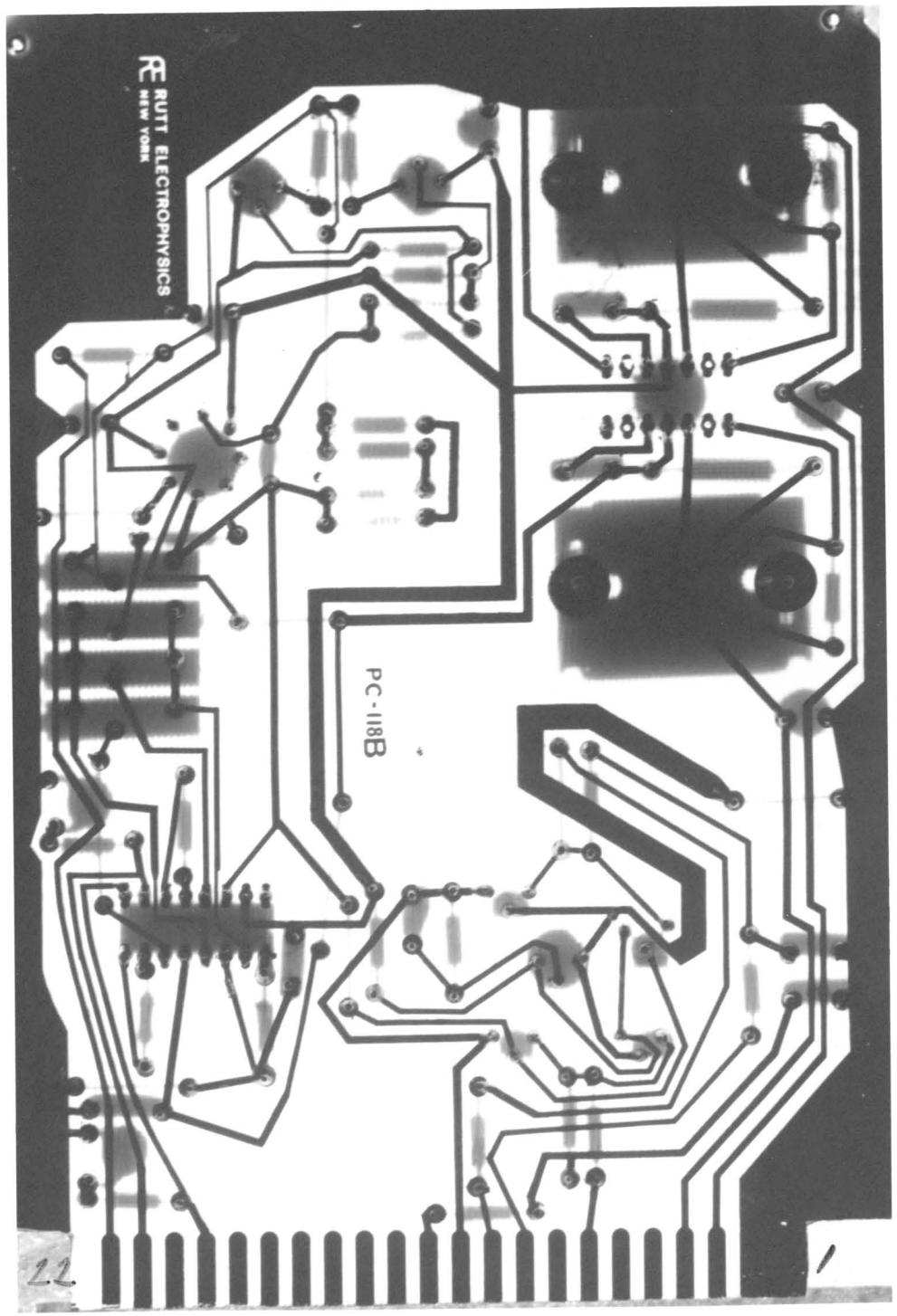
C-9
C-6
C16
MC 1494
R27
R-12
R-13
R25
R28
R29
R30
C14
C17
Sweep in
Control in
C-7
C-11
C-12
C-13
R-17
R-18
R-19
R-20
R-21
R-22
POSITION L-I
POSITION L-II
R-8
R-9
R-10
Q-3
Q-4
R-5
R-6
R-7
D-1
D-2
D-3
D-4
D-5
D-6
IC-1
OUTP
-20V
C-4
R-2
Q-1
R-1
C-1
IC-3
FET
S
D
G



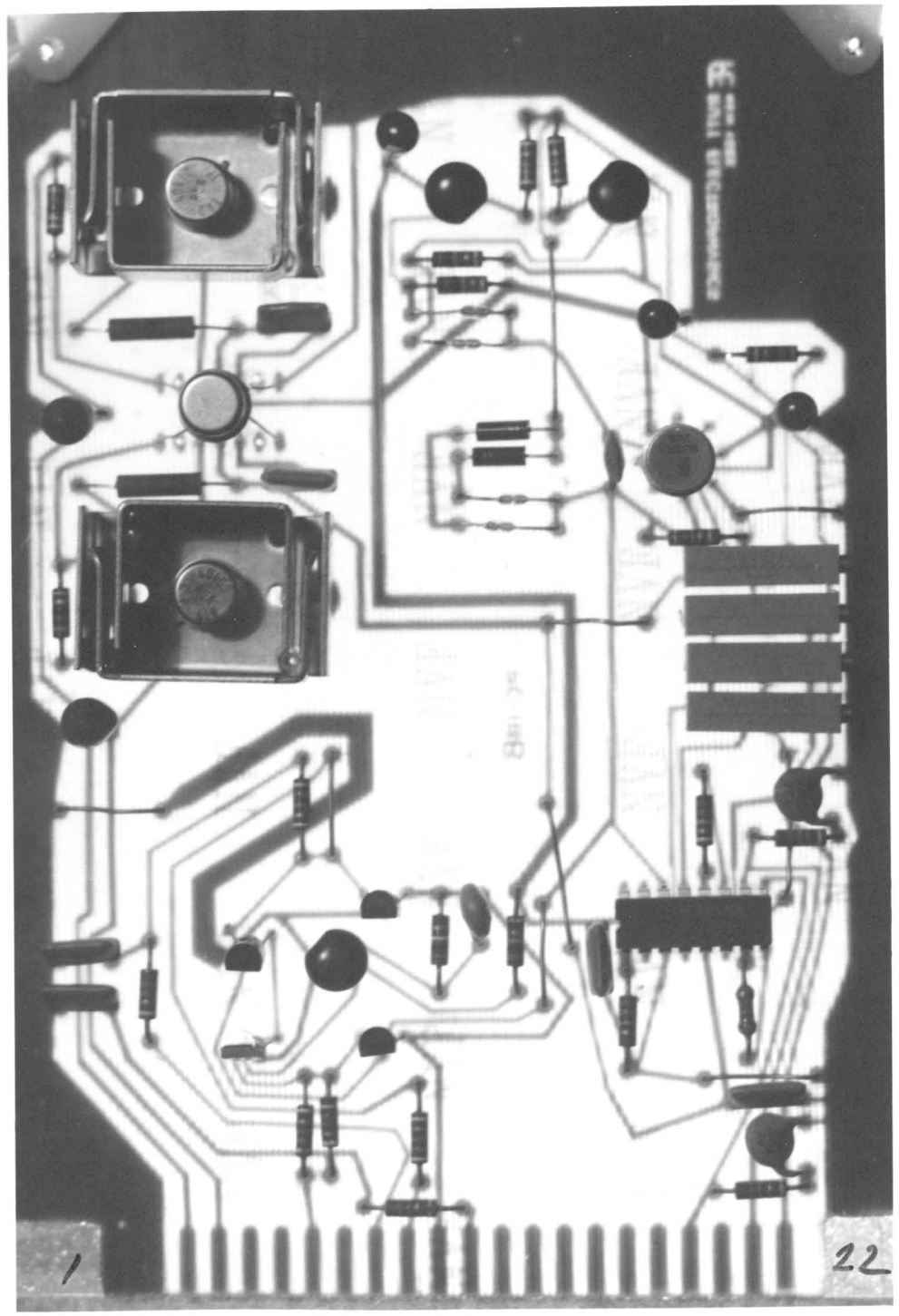
PC-118
RUTT ELECTROPHYSICS
APRIL 1974
REVISED TO 118B
HCS 28
POSITION B-1
DUAL TRACE
POSITION L-1
POSITION B-2
POSITION L-2
OUTPUT TO DISPLAY
GND
GND
-20V
+20V
IC-1
IC-3
JUMPER


PC-11B
FET
TOP VIEW
GND 1
GND 2
+20V 3
-20V 4
5
6
L-1 POS 7
8
Q-2 POS 9
L-2 POS 10
DUAL TRACE 11
POS Q-1 12
13
14
15
16
17
18
SWEEP IN 19
20
CONTROL IN 21
DISPLAY OUT 22
C-11
C-12
R-22
C-4
R-3
R-4
Q-1
Q-2
R-1
R-2
C-5
40409
40410
C-1
C-2
Q-5
Q-8
Q-9
Q-6
Q-7
R-18
R-17
R-19
Jumper
R20
R-23
C-13
R-24
C9
Q-3
Q-4
R-5
R-6
R 9
R 10
C-3
C6
C-8
C-7
R 7
C14
Xo
Yo out
offset
gain
R 28
R-13
R-12
R-11
R8
HCS
41

(HORIZONTAL)



(HORIZONTAL)



VIDEO DRIVER ±15V POWER SUPPLY

Q-9 40409

Q-10 40410

IC-11 SG4501

C-30 .01 CER.

C-31 .01 CER

C-32 6.8µf 35V TANT

C-33 6.8µf 35V TANT

R-62 DALE

R-63 DALE

R 64 75Ω

R 65 75Ω

C-34 6.8µf 35VDC TANT

C 35 ? µf OVER 300V CER.

C-29 .1µf 50V

R 66 20K TRIM (GRID #1)

R67 4.7K

C-36 .01µf 1KV DISC

C-37 " "

C-38 " "

C-39 " "

CONNECTIONS

CRT
- FIL (HOT)
- FIL (GND)
- GRID 1
- GRID 2
- CATHODE

VIDEO IN
- GND
- VIDEO IN

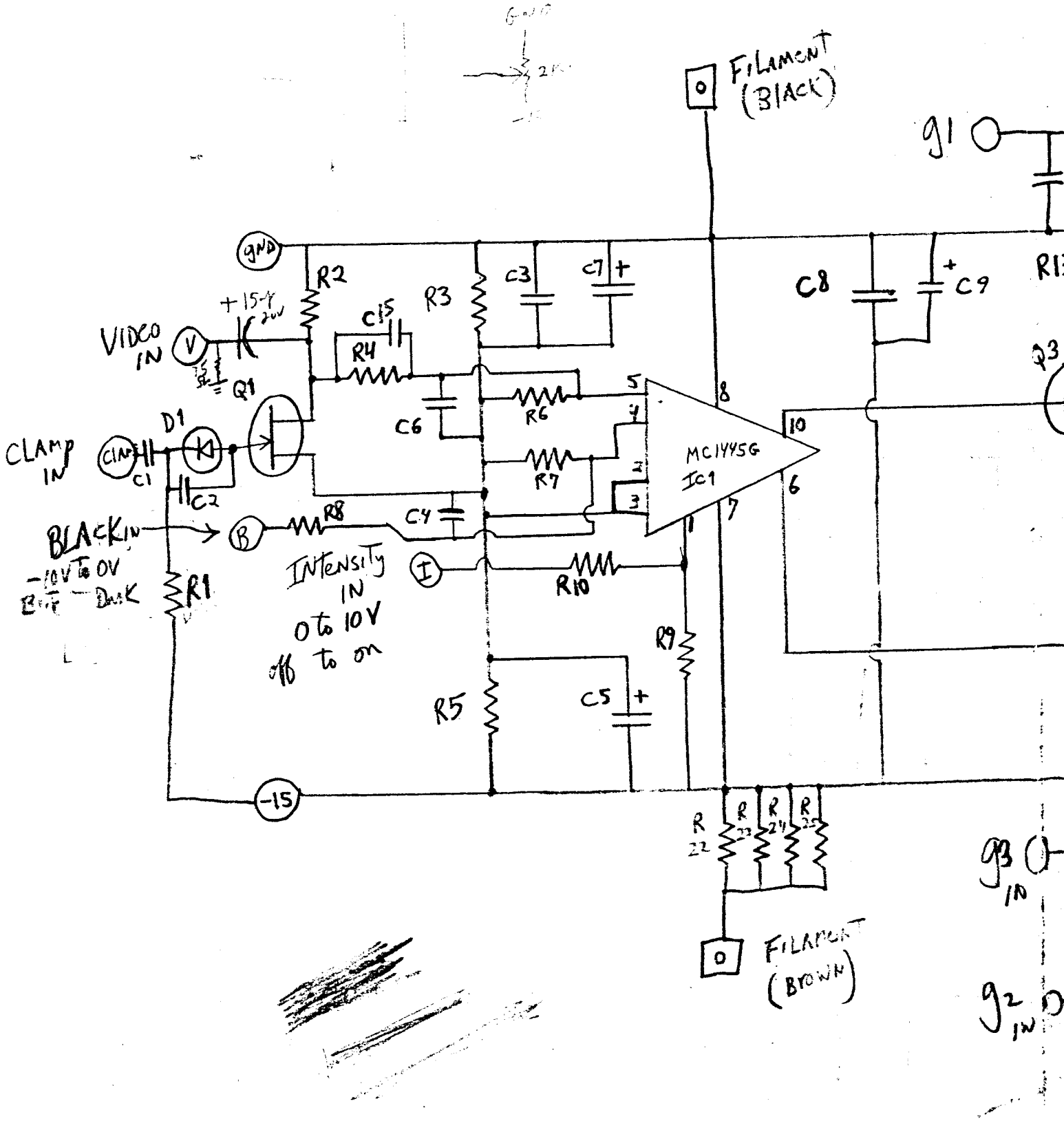
DCU
- GND
- BLANK
- D
- H
- W
- I

EDGE BLANK

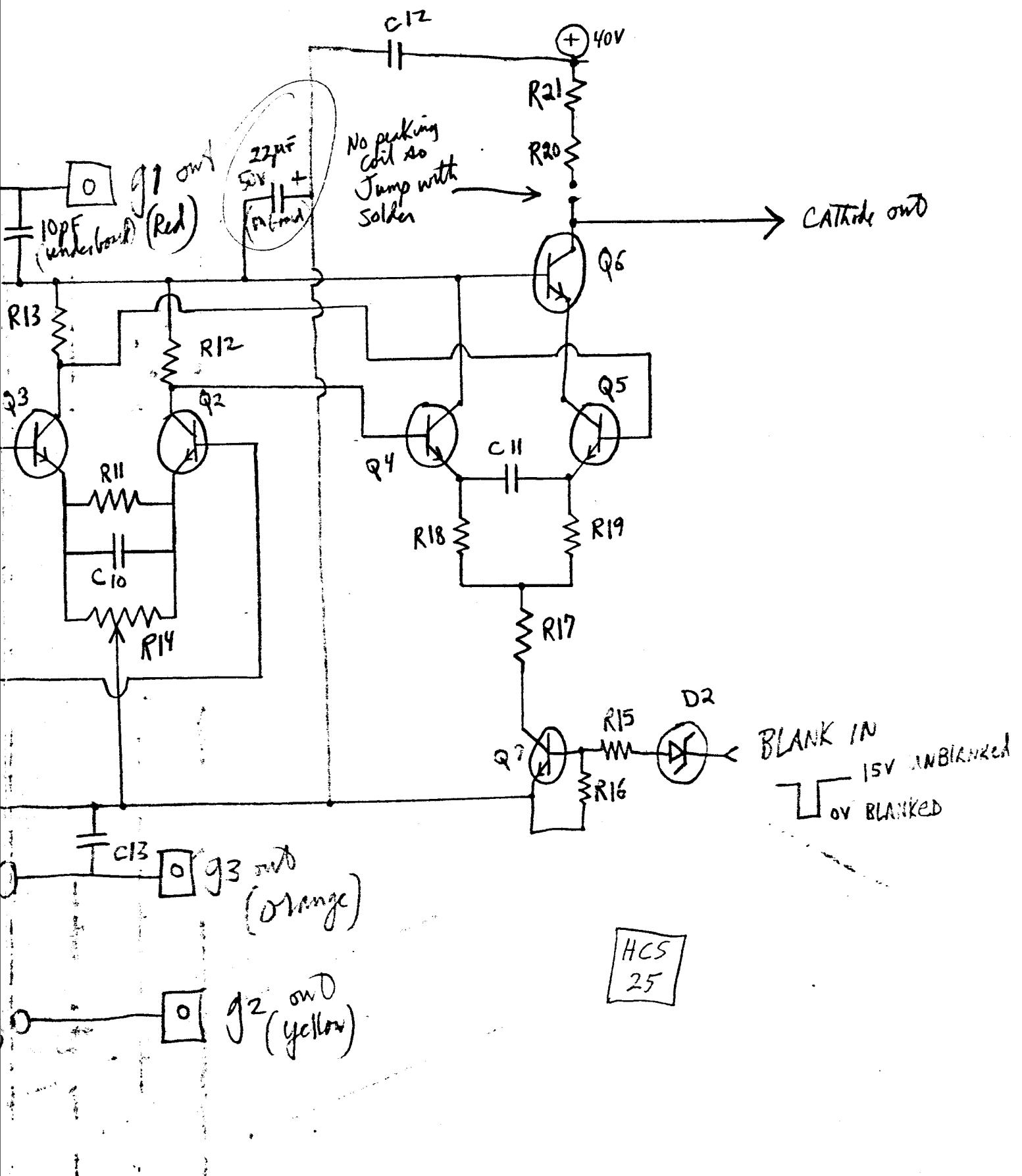
POWER SUPPLY
- +45
- +28
- GND
- -28
- 6.3V
- +300

OVER BRIGHTNESS BLANKING

VIDEO


FILAMENT (BLACK)
g1
GND
R2
R3
C3
C7
C8
C9
+15V
VIDEO IN
V
C15
R4
Q1
D1
CLAMP IN
CIN
C1
C2
C6
R6
R7
MC1445G
IC1
BLACK IN
-10V to 0V
B
R8
C4
INTENSITY IN
0 to 10V
off to on
I
R10
R1
R9
R5
C5
-15
R22
R23
R24
R25
FILAMENT (BROWN)
g3 IN
g2 IN

CRT DRIVER


C12
+ 40V
R21
R20
No peaking coil so Jump with Solder
CATHode out
22μF 50V
10pF (underboard)
g1 out (Red)
Q6
R13
R12
Q3
Q2
Q5
Q4
C11
R11
C10
R14
R18
R19
R17
D2
R15
Q7
R16
BLANK IN
15V UNBLANKED
0V BLANKED
C13
g3 out (orange)
g2 out (yellow)
HCS 25

PC 119 Parts List - Video CRT Driver

Transistors

Q1 - 2N4091
Q2 - 2N5770,or MPS 6543, Hep56
Q3 - or Hep 720
Q4 - strap pairs together
Q5 - for thermal contact
Q6 - 2N2219A
Q7 - MPS 5172

Integrated Circuits

IC1 - MC 1445 G (or MC1545G is OK but expensive...) Use Heat SINK

Parts List PC 119 — Video CRT Driver *

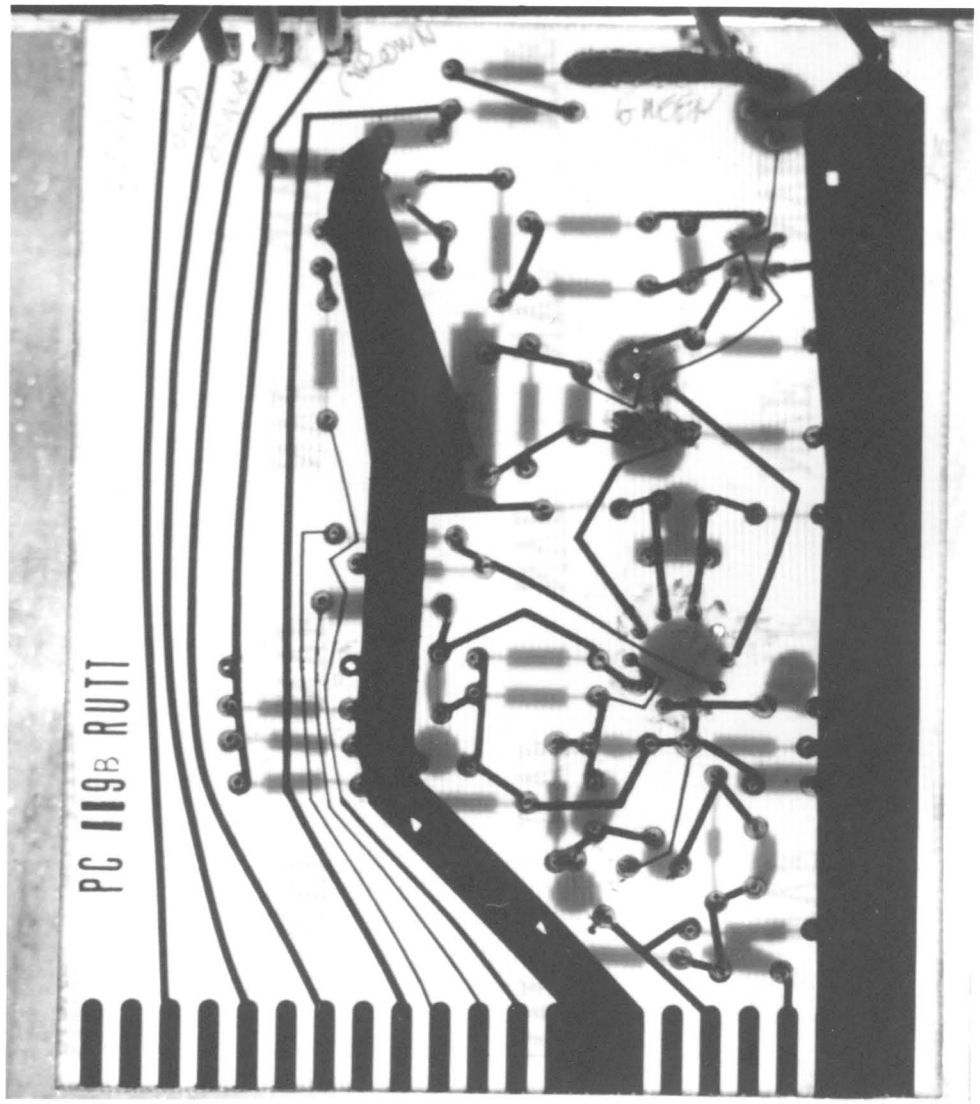
D1	1N914
D2	1N5248 (18 V zener)
→ Q1	2N4091
Q2, Q3, Q4, Q5	2N5770, MPS 6543, Hep 56, Hep 720 Transistors — strap these together
→ Q6	2N2219A
→ Q7	MPS 5172 transistor
R1	47K — all 1/4 watt 5%
R2	75 Ω
R3	270 Ω
R4	[illegible] — 27K
R5	180 Ω
R6	1K
R7	1K
R8	470K — use 2-1 Meg in parallel if you don't have 470K
R9	3.3K (3.6K is not as good) (use 6.8K if R9=3.6K)
R10	4.7K
R11	[illegible] 51 Ω [illegible]
R12	470 Ω
R13	470 Ω
R14	2K pot
R15	1K
R16	1K
→ R17	[illegible] 180 Ω
R18	51 Ω
R19	51 Ω
R20	510 Ω
R21	510 Ω
R22, 23, 24, 25	[illegible] Use 3 - 120 Ω (R22, 23, 24) or 4 - 150 Ω (R22, 23, 24, 25) (to equal 40 Ω)

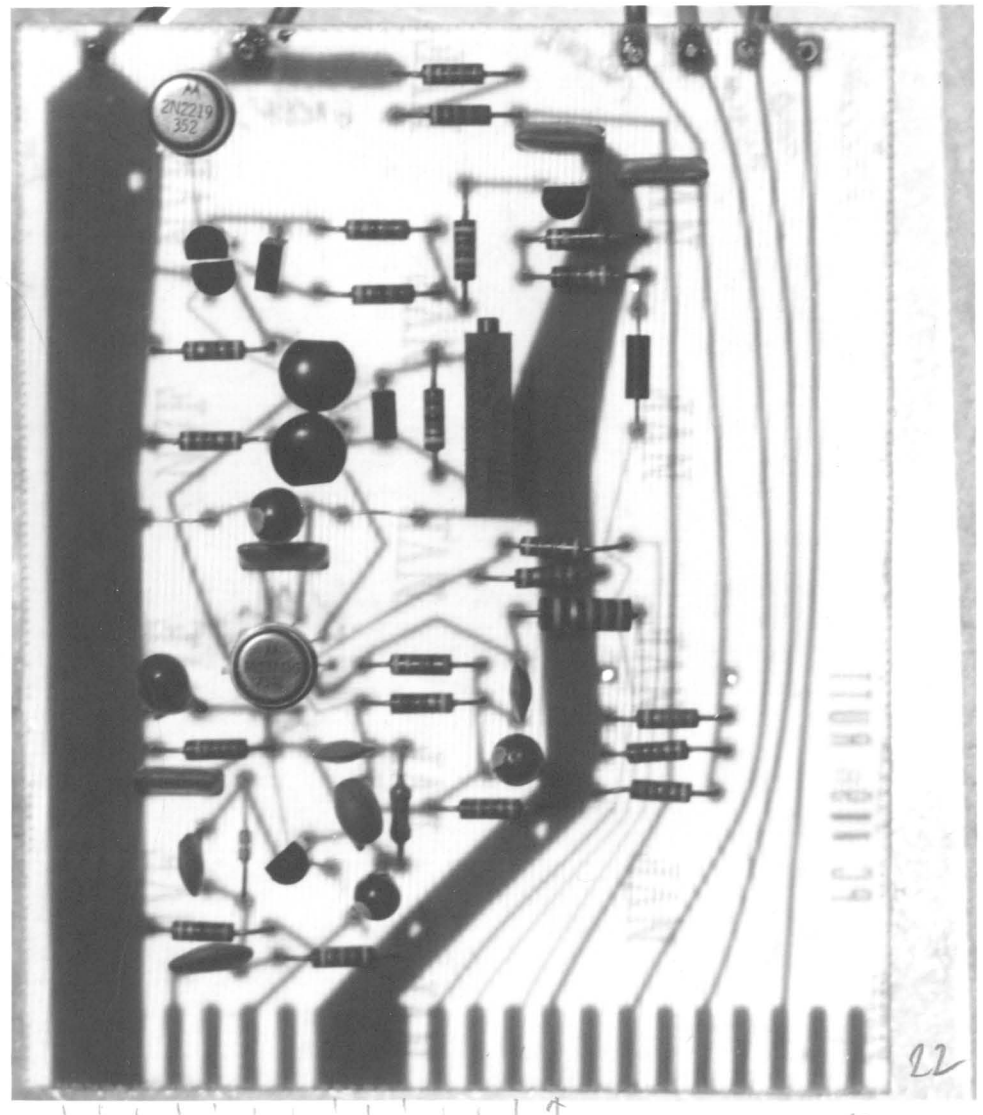
IC1	MC1445G (1545G is OK also but expensive)
	Heatsink IC1
C1	.001
C2	10 pF
C3	.1 ceramic
C4	33 pF
C5	15 µF/20V
C6	33 pF
C7	15 µF/20V
C8	.1 ceramic
C9	15 µF/20V
C10	[illegible] 100 pF *
C11	[illegible] 100 pF *
C12	.1 µF ceramic
C13	.1 µF ceramic
C14	15 µF/20V
C15	gimmick * ~1 pF

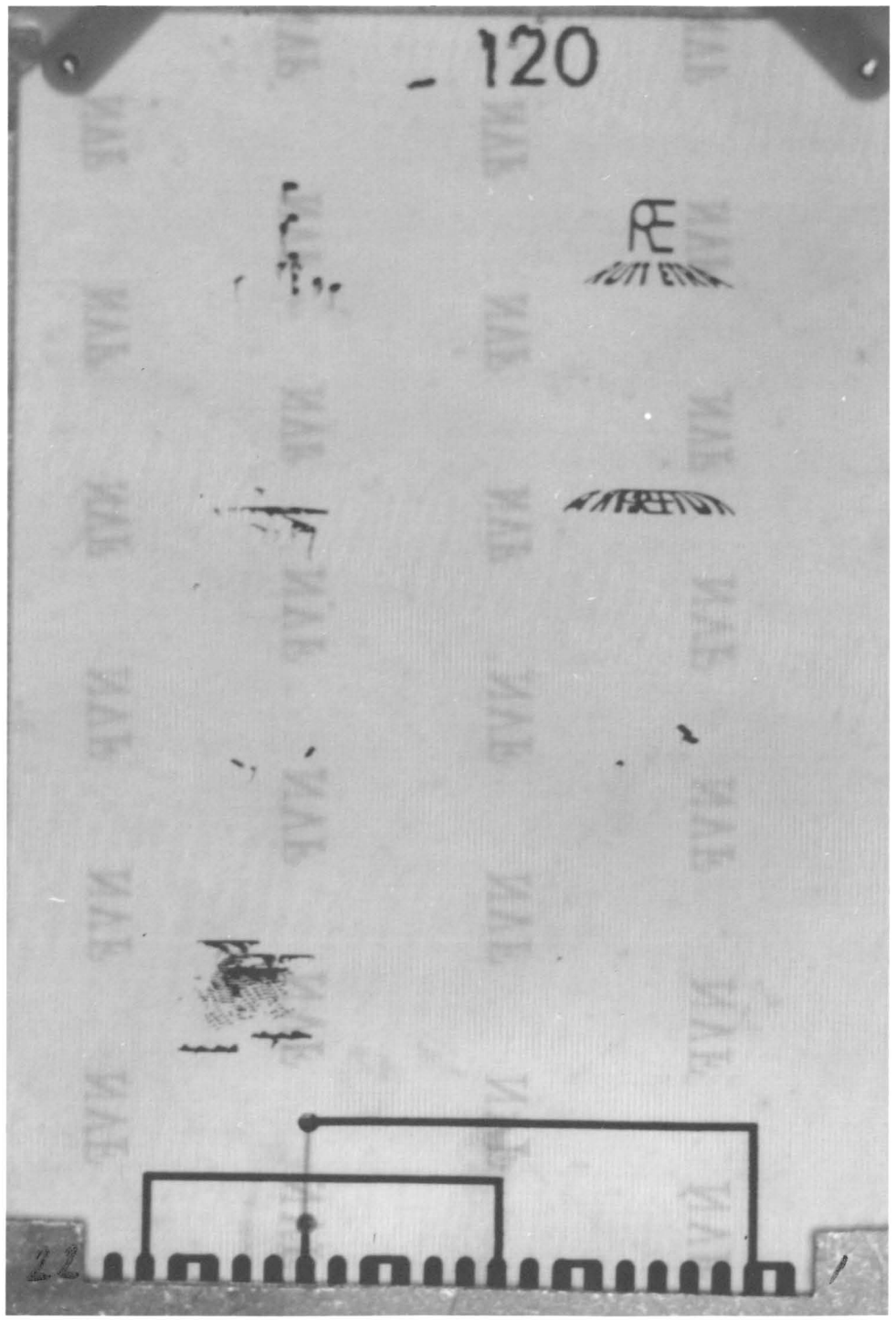
AHA!

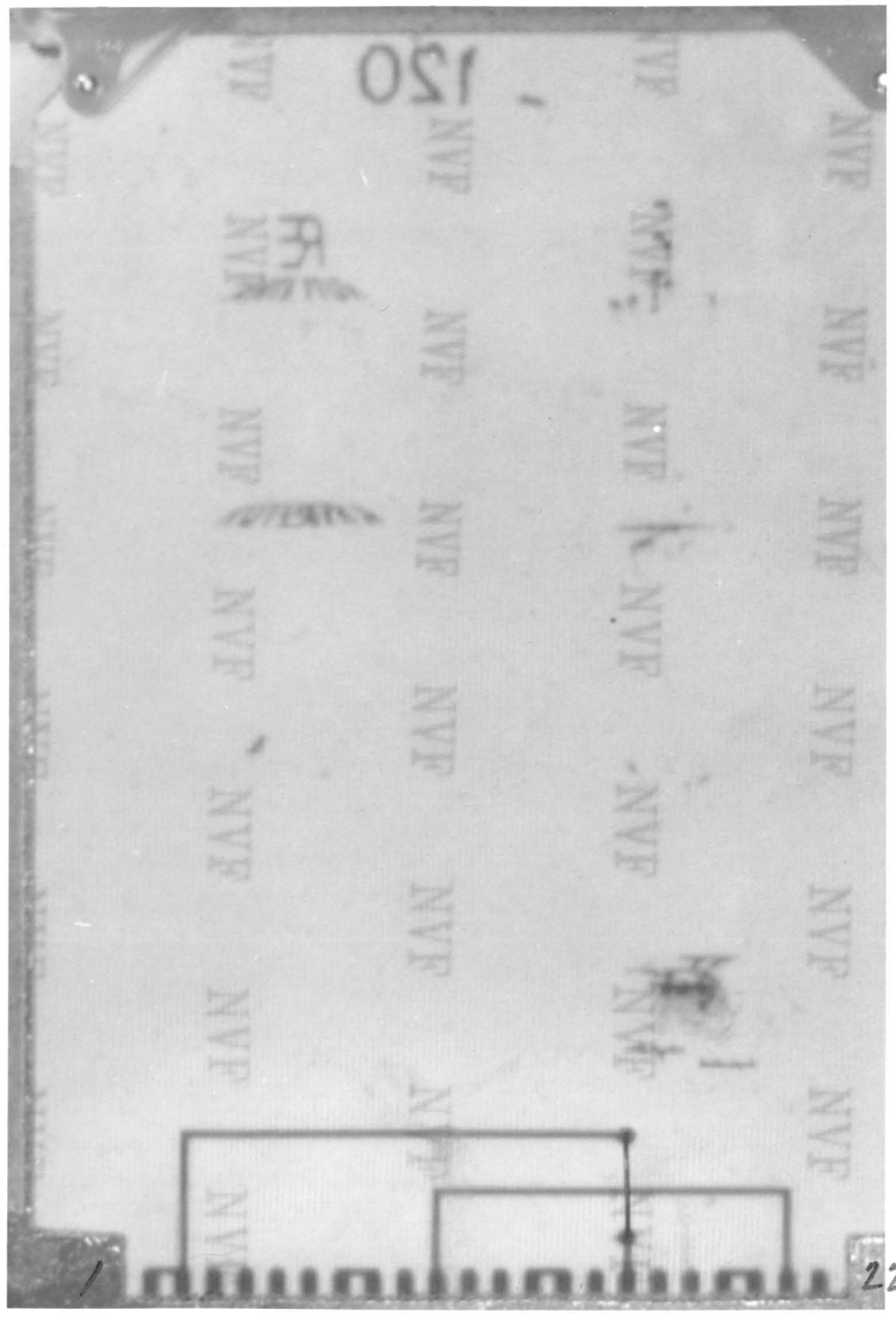
* These parts are fine for NON-30 MHZ use; for broadcast use, C10, C11 and C15 are critical and need adjustment for each board

HCS 37


PC 119B RUTT


2N2219
352
22
20
12
13
±40
BRIGHTNESS


- 120
22
1


- 120
1
22

PC-121

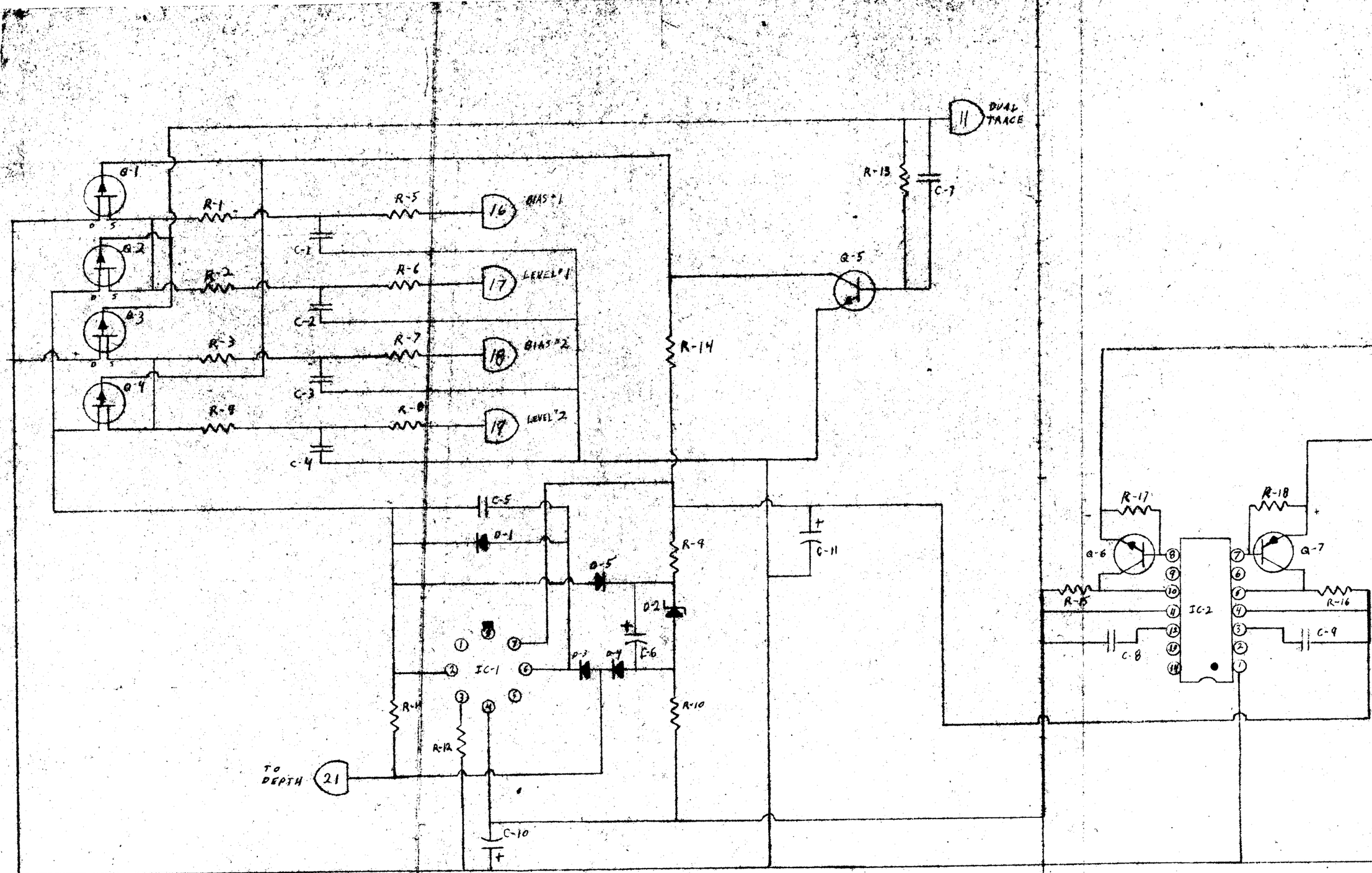
Q-1	FET 3462		4	C-1	.1 Cer -	R-1	8.2K -
Q-2	FET "		4	C-2	.1 Cer -	R-2	8.2K -
Q-3	FET "		4	C-3	.1 Cer -	R-3	8.2K -
Q-4	FET "	UNDER BOARD	4	C-4	.1 Cer -	R-4	8.2K -
Q-5	NPN		4	C-5	5PF -	R-5	1K -
Q-6	NPN - 2N3565		3	C-6	15uf 20V -	R-6	1K -
Q-7	PNP - 110T 40409		4	C-7	100PF -	R-7	1K -
Q-8	40409		4	C-8	.1 Cer -	R-8	1K -
Q-9	40410		4	C-9	.1 Cer -	R-9	15K -
			3	C-10	15uf 20V -	R-10	15K -
			3	C-11	15uf 20V -	R-11	20K -
			4	C-12	.1 Cer -	R-12	4.7K -
			4	C-13	.1 Cer -	R-13	100K -
			3	C-14	15uf 20V -	R-14	10K -
			3	C-15	15uf 20V -	R-15	.5Ω Dale -
			3	C-16	10uf 25V -	R-16	.5Ω Dale -
			3	C-17	10uf 25V -	R-17	75Ω -
						R-18	75Ω -
						R-19	75Ω -
						R-20	75Ω -
						R-21	.5 Dale -
						R-22	.5 " -
						R-23	50K POT (60K)

IC-1	LM318 - OP AMP
IC-2	SG4501 REGULATOR
IC-3	SG4501 "

R23 ± 10 VOLT ADJUST CW → INCREASE
PIN 6 → + 10

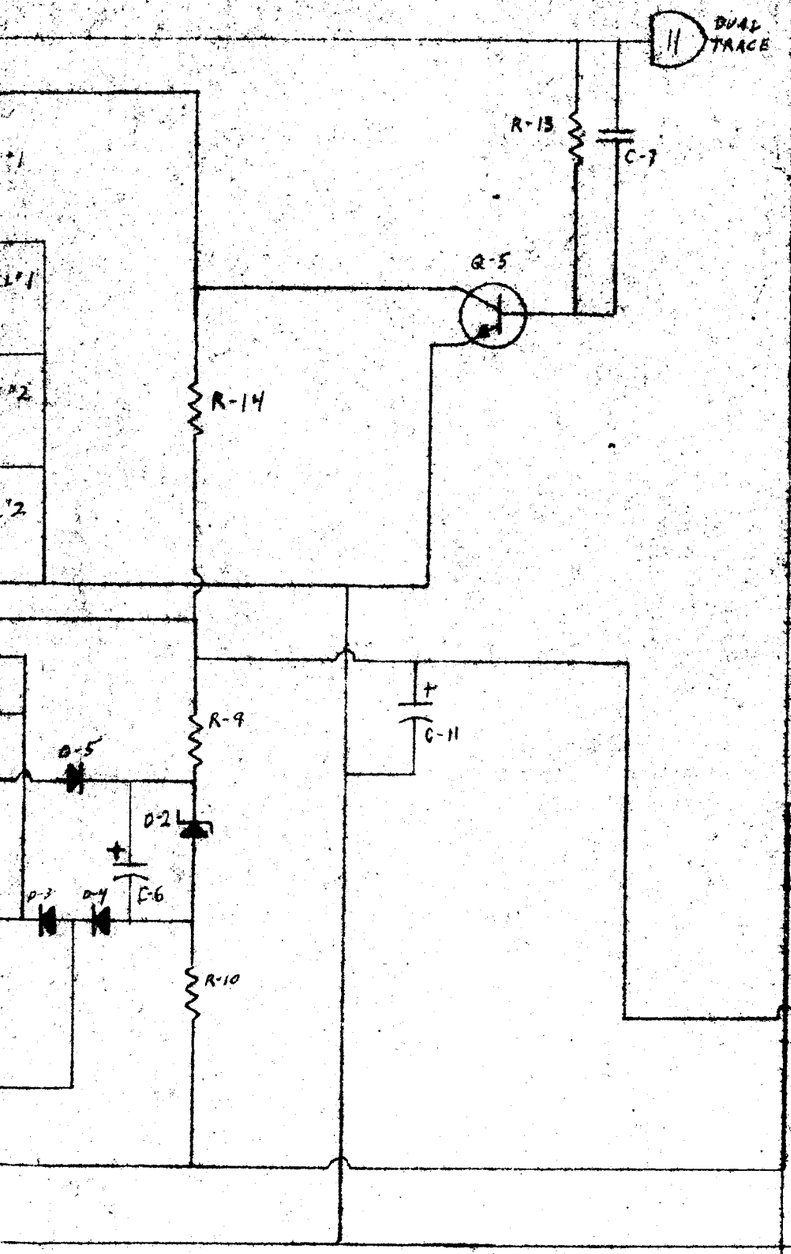
D-1	IN914
D-2	9.1V ZENER
D-3	IN914
D-4	"
D-5	"

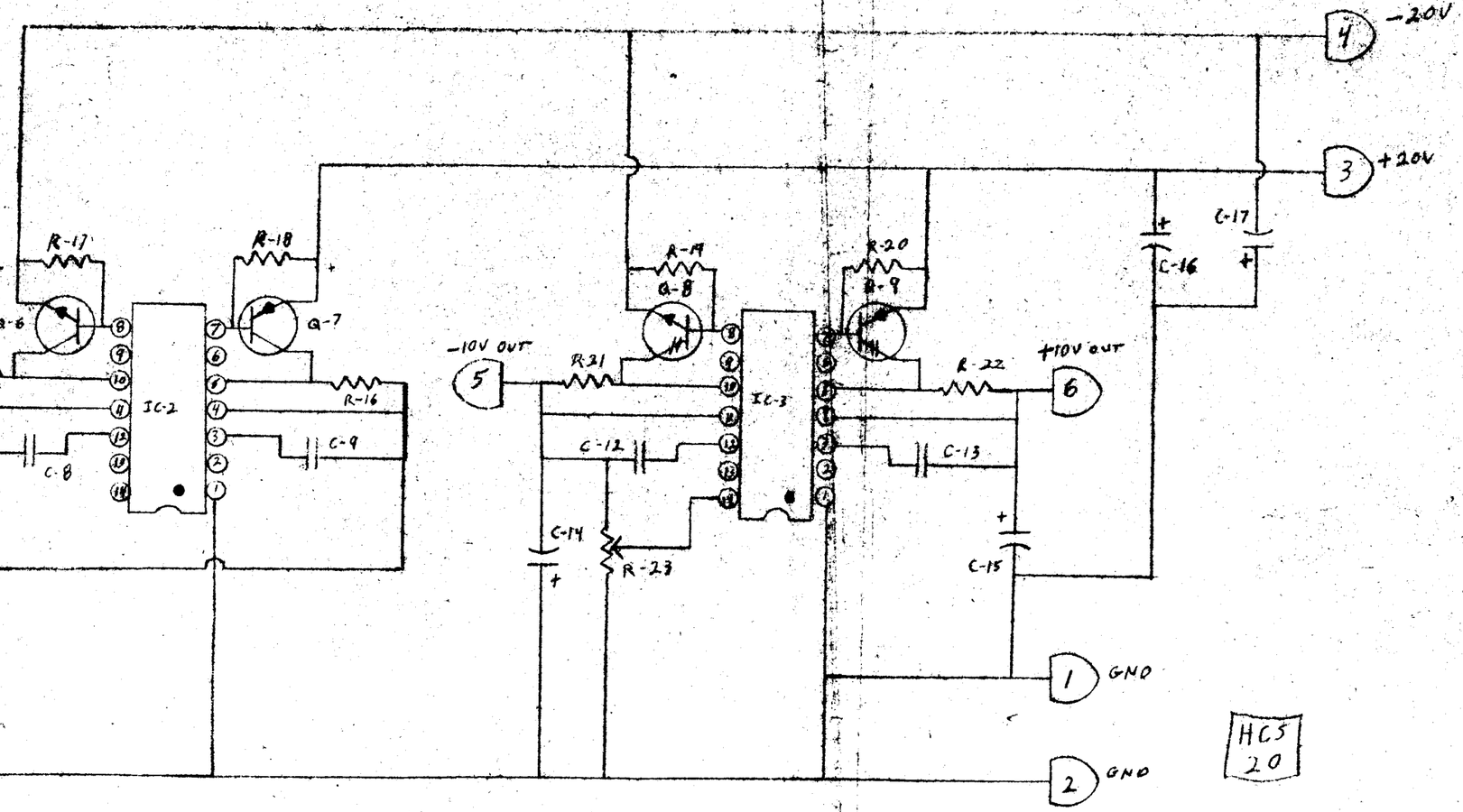
HCS 65


Q-1
Q-2
Q-3
Q-4
R-1
R-2
R-3
R-4
R-5
R-6
R-7
R-8
R-9
R-10
R-11
R-12
R-13
R-14
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
D-1
D-2
D-3
D-4
D-5
IC-1
IC-2
Q-5
Q-6
Q-7
R-15
R-16
R-17
R-18
11 DUAL TRACE
16 BIAS #1
17 LEVEL #1
18 BIAS #2
19 LEVEL #2
TO DEPTH 21

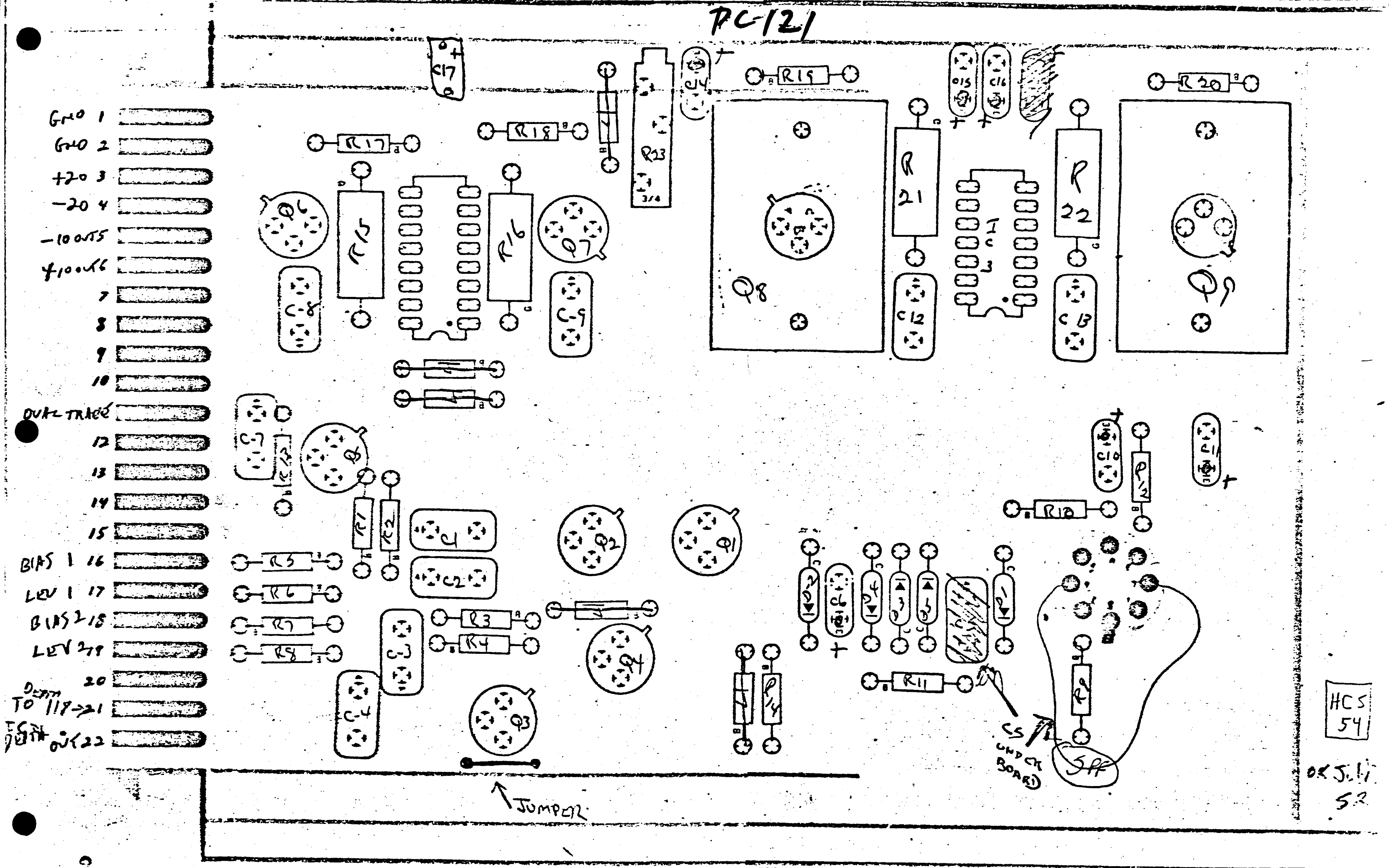
PC-121

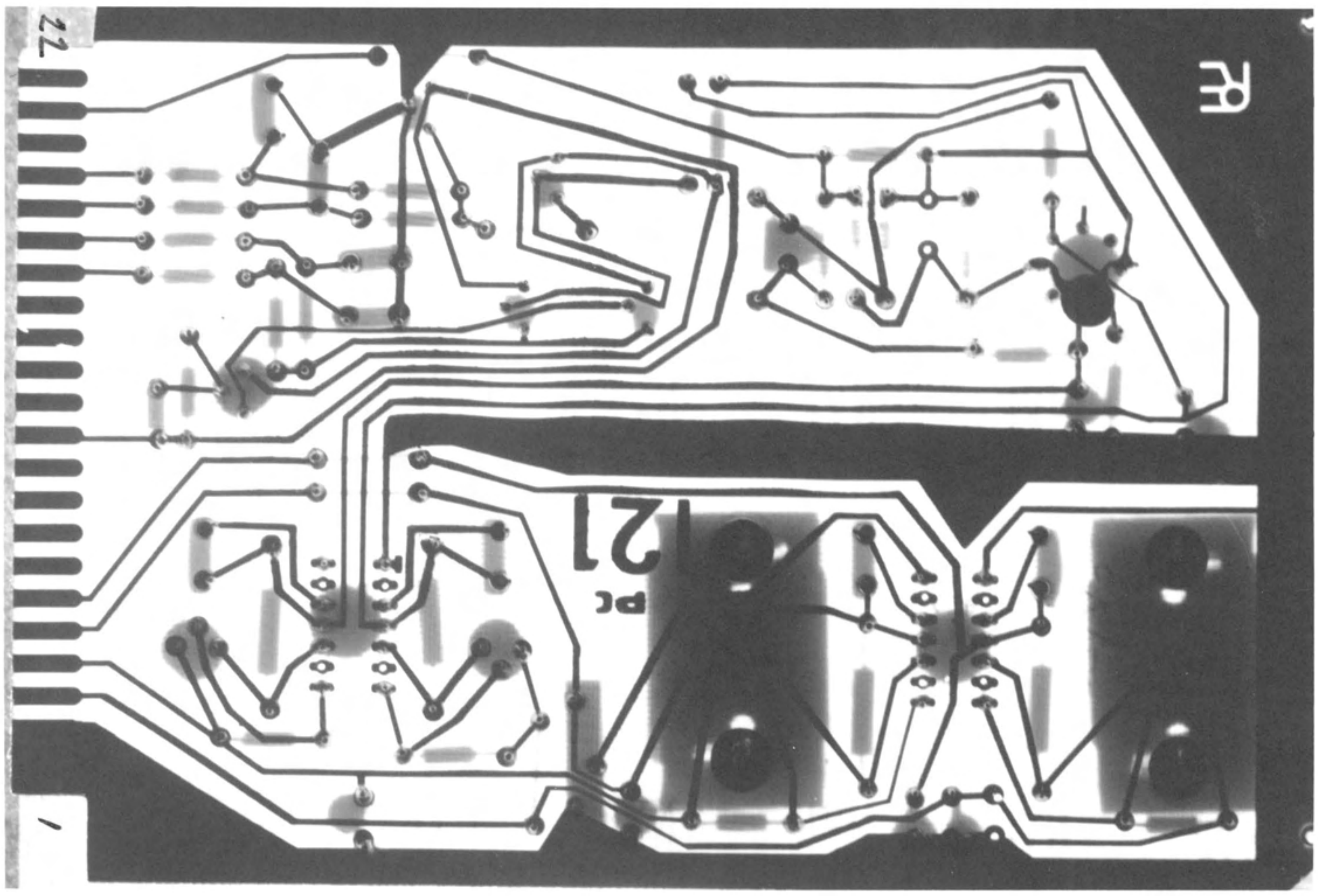
RUTT ELECTROPHYSICS
APRIL 1974

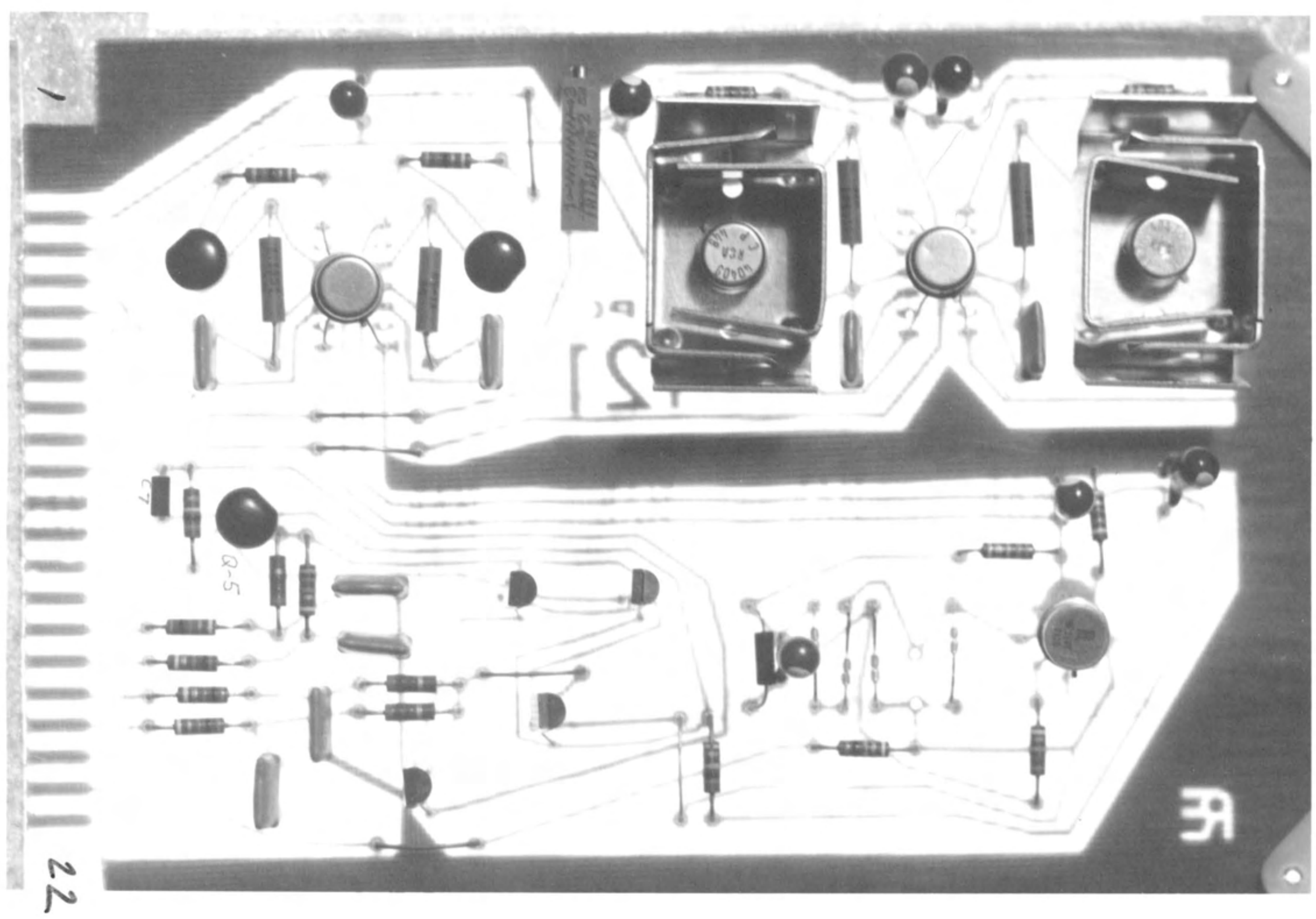




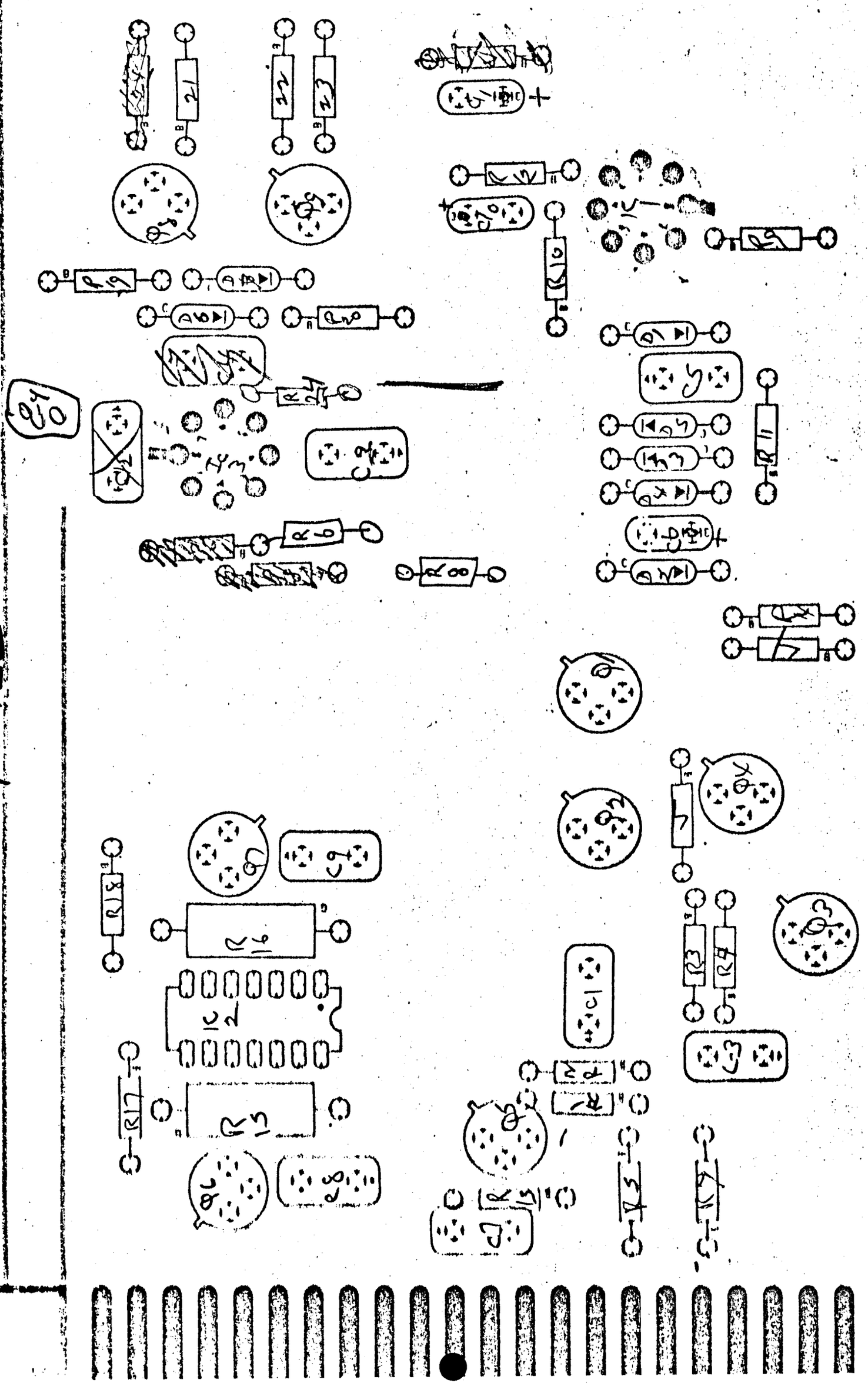
HCS
20


PC 121
GND 1
GND 2
+20 3
-20 4
-10 OUT 5
+10 OUT 6
7
8
9
10
DUAL TRACE
12
13
14
15
BIAS 1 16
LEV 1 17
BIAS 2 18
LEV 2 19
20
TO 118 21
OUT 22
C17
R17
R18
R23
C14
R19
C15
C16
R20
R15
R16
Q6
Q7
Q8
Q9
R21
R22
C-8
C-9
C12
C13
C-7
R1
R2
C1
C2
Q2
Q1
R5
R6
R7
R8
R3
R4
C-3
C-4
Q3
Q4
C10
C11
R10
R11
R14
CS
UNDER BOARD
JUMPER
HCS 54





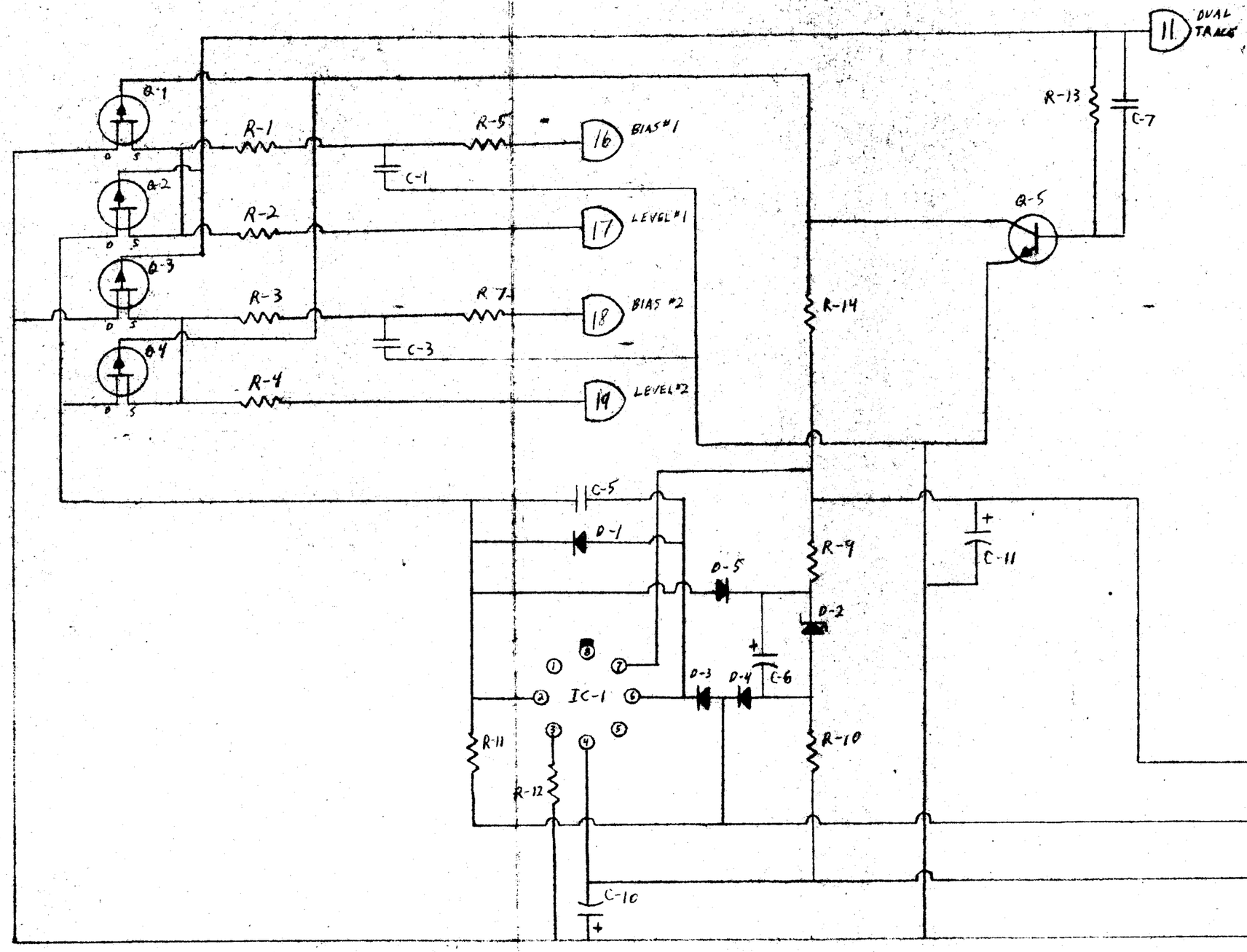
PC-122



PC-122

RUTT ELECTROPHYSIC

APRIL 1974

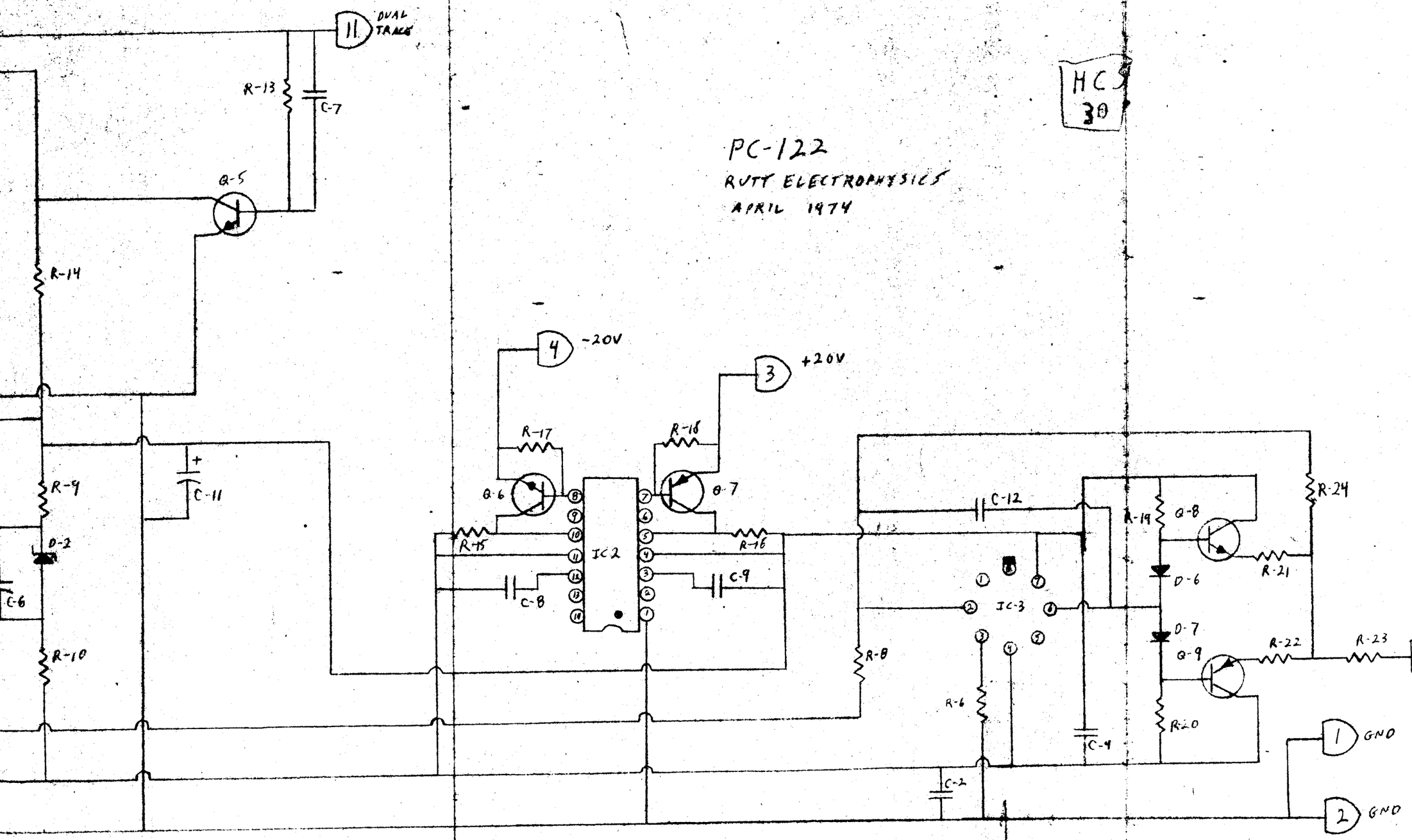


1

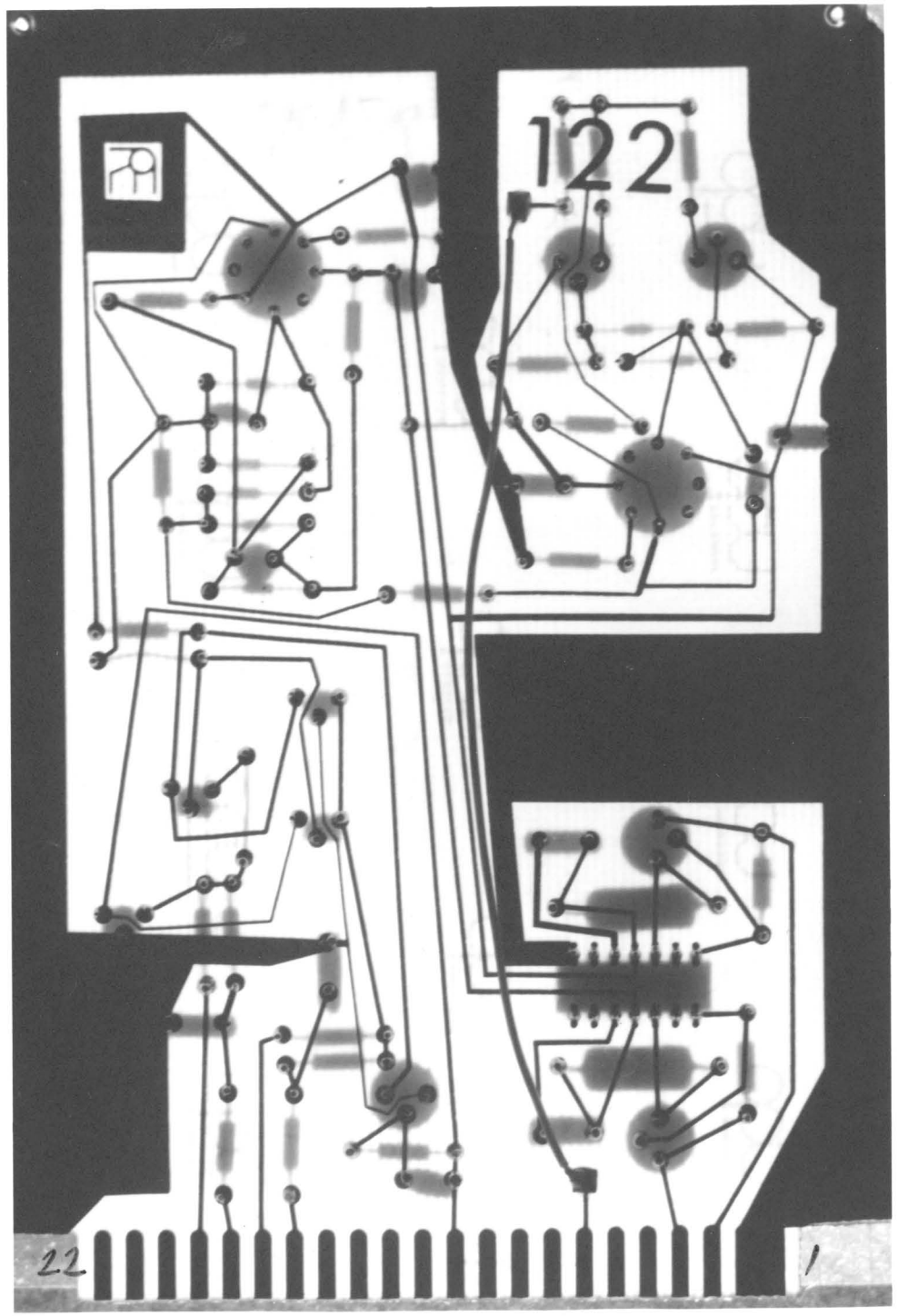
HC 5
30

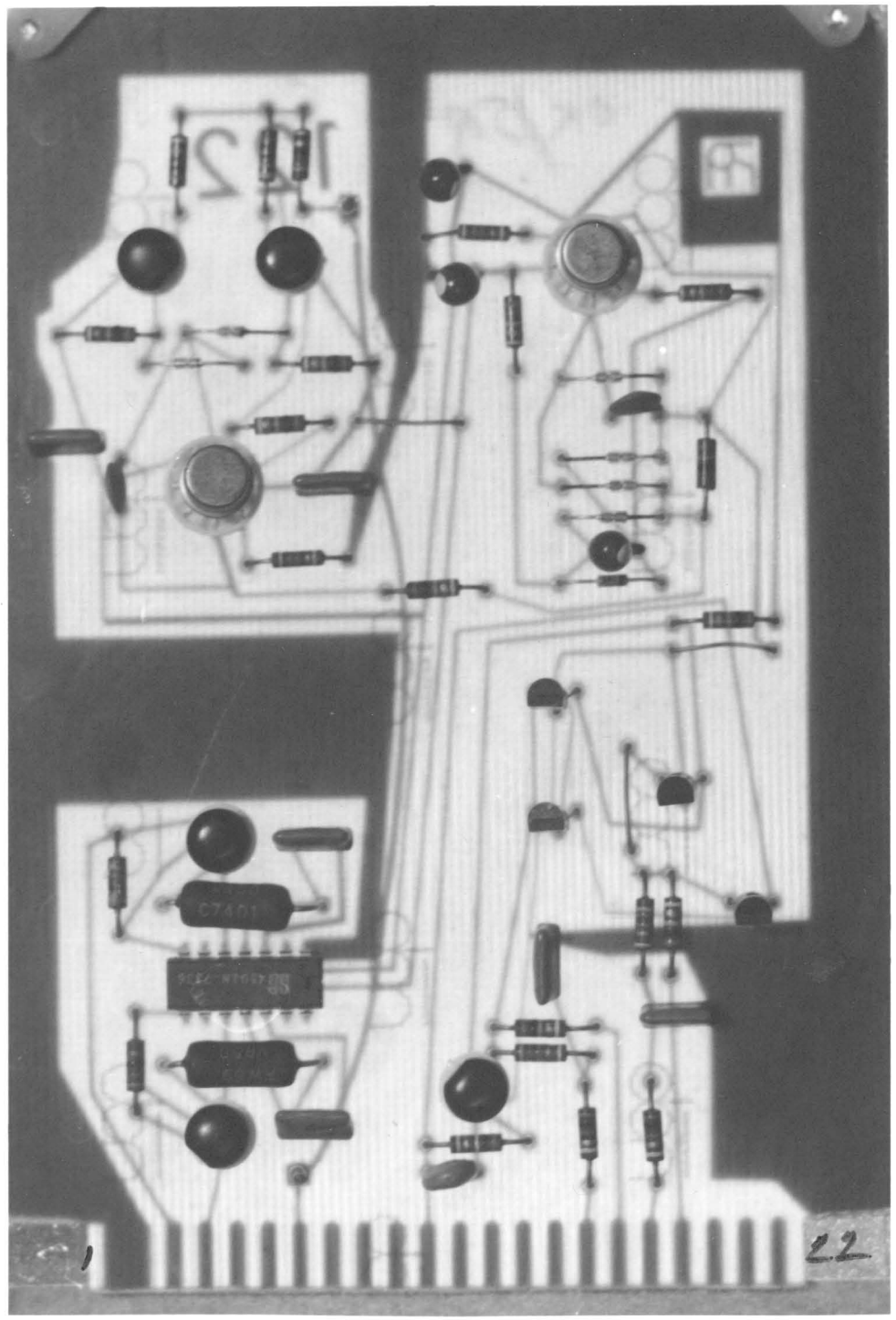
PC-122

RUTT ELECTROPHYSICS
APRIL 1974



INTENSITY

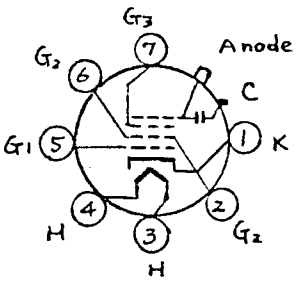




Minimum screen dimensions (projected)

Diagonal	4.921" (127.3 mm)
Width	4.291" (109.9 mm)
Height	3.267" (84.9 mm)
Weight (Approx.)	0.5 kg
Operating Position	Any
Anode cap	Small Cavity (J1-21)
Base	Small-Button Special miniature 7 pin (E7-91)
Basing	

Bottom view



Pin 1-Cathode
Pin 2-Grid-No.2
Pin 3-Heater
Pin 4-Heater
Pin 5-Grid-No.1
Pin 6-Grid-No.2
Pin 7-Grid-No.3

Cap-Anode (Grid No.4 screen collector)

C-External conductive coating

GRID-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to cathode.

MAXIMUM AND MINIMUM RATINGS
(Design-Maximum Values)

Anode Voltage	10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value	1100 max volts
Negative value	550 max volts
Grid-No.2 Voltage	550 max volts 250 min volts
Grid-No.1 Voltage:	
Negative-bias value	125 max volts
Positive-bias value	0 max volts
Positive-peak value	2 max volts
Heater voltage	13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	
Combined AC & DC Voltage	130 max volts
DC Component	80 max volts

EQUIPMENT DESIGN RANGES

Grid-No.3 Current	-25 to +25 μA
Grid-No.2 Current	-15 to +15 μA
Field Strength of Adjustable Centering magnet 2)	0 to 10 gausses

TYPICAL OPERATING CONDITIONS

Anode Voltage	8000 volts
Grid-No.2 Voltage	400 volts
Grid-No.3 Voltage for focus 3)	0 to 400 volts
Grid-No.1 Voltage for visual extinction of focused raster	-22 to -46 volts

MAXIMUM CIRCUIT VALUES

Grid-No.1 Circuit Resistance	1.5 max. megohms

CATHODE-DRIVE SERVICE

Unless otherwise specified, voltage values are positive with respect to Grid-No.1

MAXIMUM AND MINIMUM RATINGS
(Design-Maximum Values)

Anode Voltage	10000 max volts 7000 min volts
Grid-No.3 (Focusing) Voltage:	
Positive value	1100 max volts
Negative value	550 max volts
Grid-No.2 Voltage	550 max volts 250 min volts
Cathode Voltage:	
Positive-bias value	125 max volts
Negative-bias value	0 max volts
Negative-peak value	2 max volts
Heater voltage	13.9 max volts 11.3 min volts
Peak Heater-Cathode Voltage 1)	
Combined AC & DC Voltage	130 max volts
DC Component	80 max volts

EQUIPMENT DESIGN RANGES

Grid-No.3 Current	-25 to +25 /uA
Grid-No.2 Current	-15 to +15 /uA
Field Strength of Adjustable Centering magnet 2)	0 to 10 gaussess

TYPICAL OPERATING CONDITIONS

Anode Voltage	8000 volts
Grid-No.2 Voltage	400 volts
Grid-No.3 Voltage for focus 3)	0 to 400 volts
extinction of focused raster	20 to 43 volts

MAXIMUM CIRCUIT VALUES

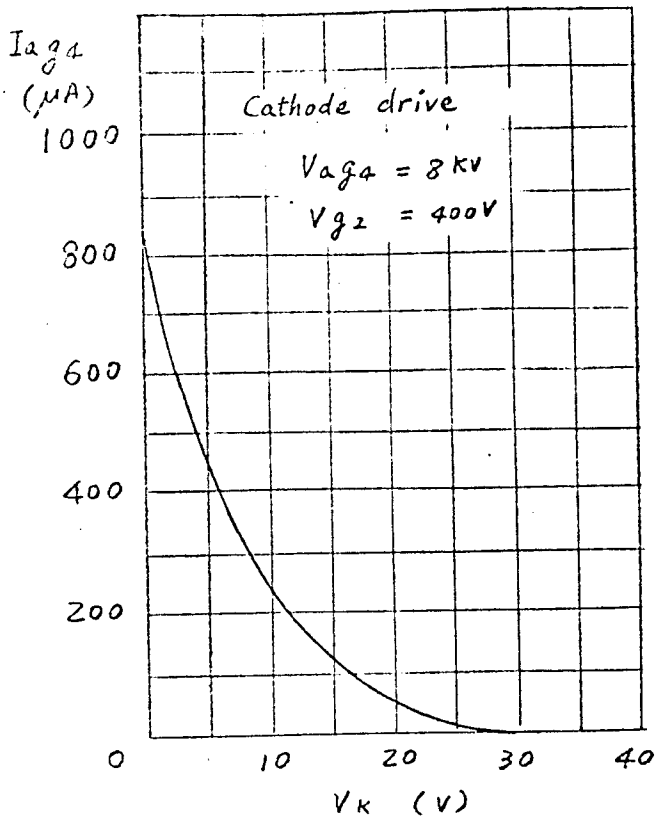
Grid-No.1 Circuit Resistance	1.5 max negohms

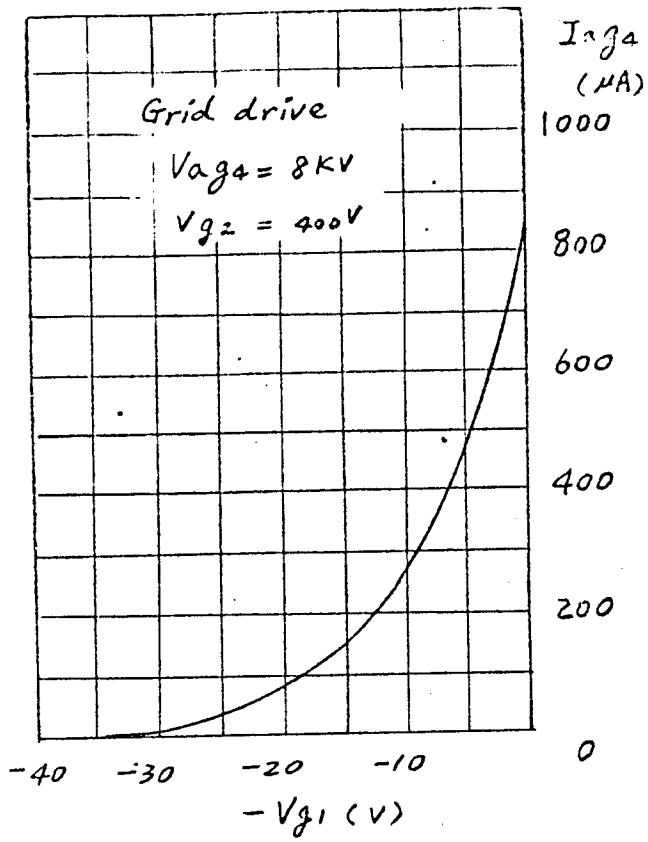
NOTES

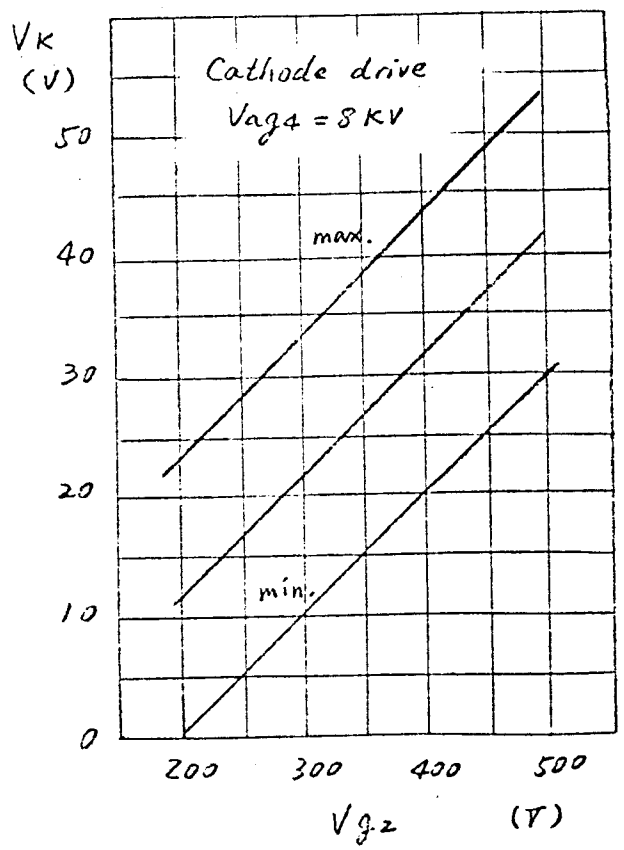
1) To avoid excessive hum the AC component of the heater to chassis voltage should be as low as possible and must not exceed 20V r.m.s.

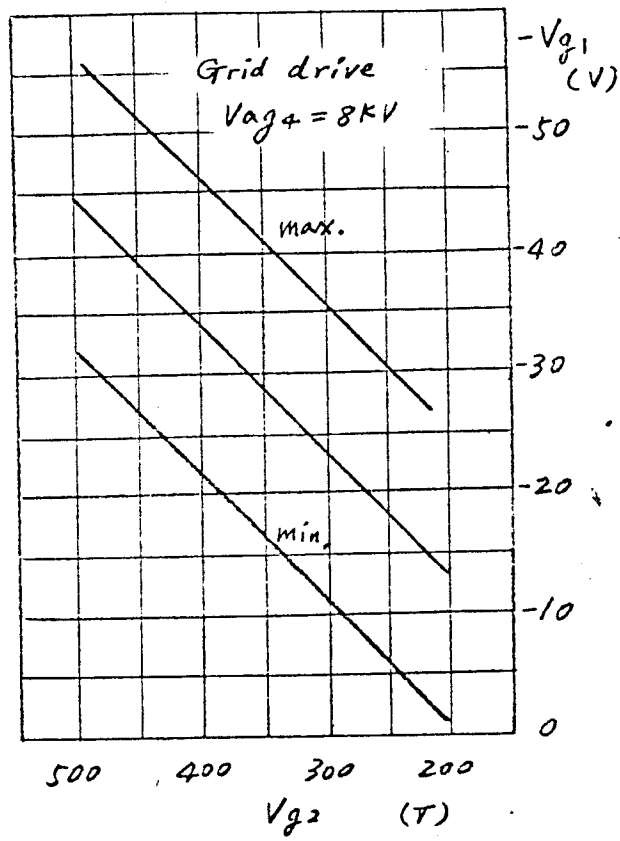
2) The maximum distance between the centre of the field of this magnet and the reference line is 1.42" (36 mm).
The centring magnet should be mounted as close to the deflection coils as possible.

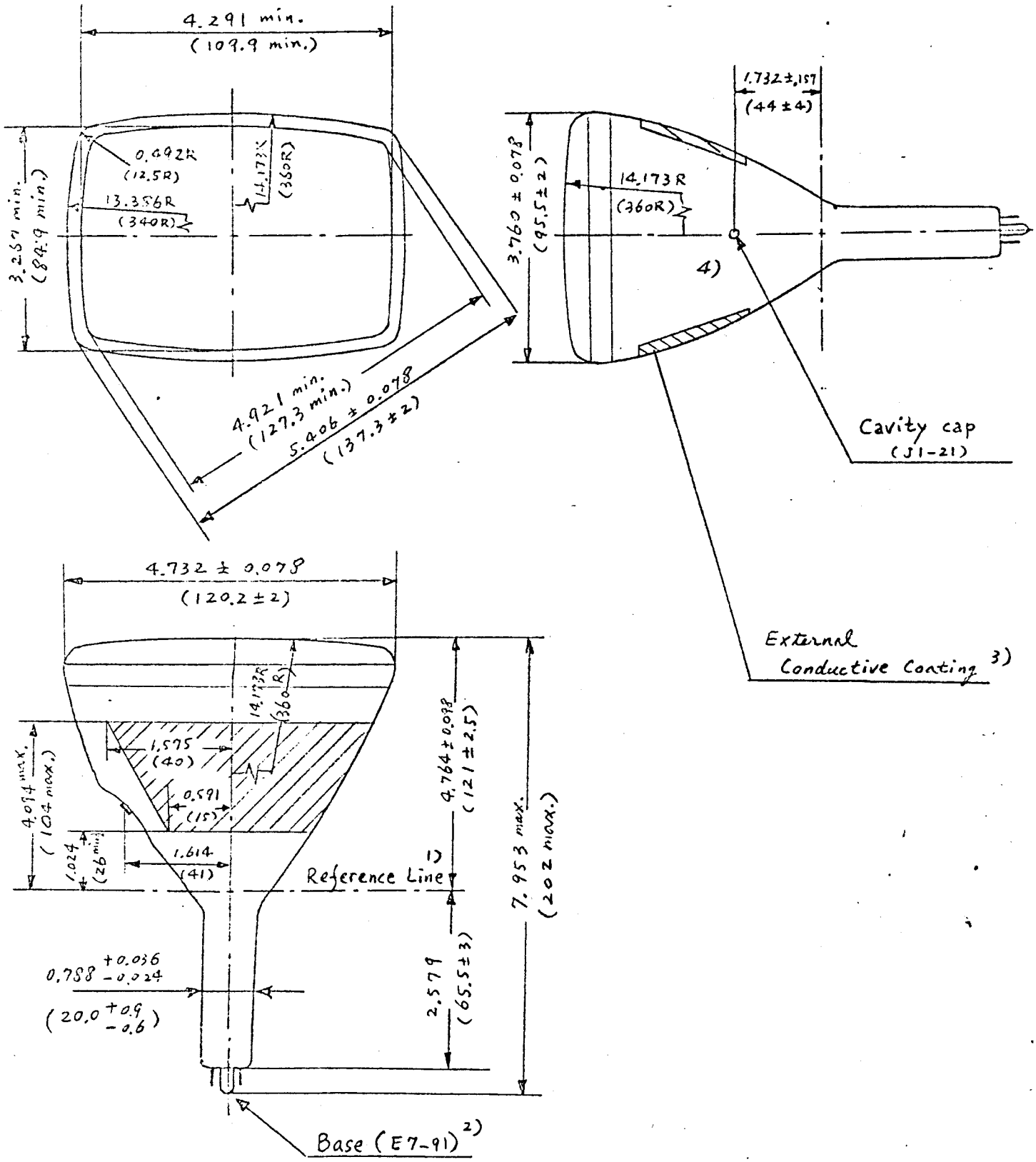
3) Voltage range necessary to obtain optimum overall focus at a beam current of 55 /uA.


Ia g4 (μA)
Cathode drive
Vag4 = 8 KV
Vg2 = 400V
1000
800
600
400
200
0
10
20
30
40
VK (V)


Ia g4 (μA)
Grid drive
Vag4 = 8 KV
Vg2 = 400V
1000
800
600
400
200
0
-40
-30
-20
-10
-Vg1 (V)


VK (V)
Cathode drive
Vag4 = 8 KV
max.
min.
50
40
30
20
10
0
200
300
400
500
Vg2 (V)


-Vg1 (V)
Grid drive
Vag4 = 8 KV
max.
min.
-50
-40
-30
-20
-10
0
500
400
300
200
Vg2 (V)



Dimensions in Inches (mm)

NOTES (Concerning Sheet 6)

1) The reference line is determined by Reference line gauge JEDEC Type No. G-R55J1.

2) The socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of the base wafer will fall within a circle concentric with the bulb axis and having a diameter of 1.58" (40 mm).

3) The configuration of the outer coating is optional, but must contain the contact area as shown in the drawing.
The external coating must be earthed.

4) This area must be kept clean.

Q-1	NPN MPSA18
Q-2	" "
Q-3	PNP MPSA65
Q-4	PNP "
Q-5	NPN MPSA
Q-6	NPN
Q-7	
Q-8	
Q-9	RCA 40410
Q-10	RCA 40408
Q-11	NPN MPSA06

D-1	IN914
D-2	
D-3	
D-4	

C-1	6.8μF 35VDC
C-2	COMP 2200PF
C-3	2200PF
C-4	.1
C-5	.1
C6	.1 "
C7	.1 "
C8	15μF 20V
C9	" "
C10	6.8μF 35V
C11	6.8μF 35V
C-12	35μF 50V
C-13	35μF/50V
C-14	
C17	

R-1	10K
R-2	10K
R-3	470Ω
R-4	470Ω
R-5	120Ω
R-6	120Ω
R-7	10K
R-8	33K
R-9	33K
R-10	2K POT
R-11	33K
R-12	5K POT
R13	4.7Ω
R14	4.7Ω
R15	470Ω
R16	.5Ω
R17	.5Ω
R18	.5Ω
R19	.5Ω
R20	.5Ω
R21	.5Ω
R22	.5Ω
R23	.5Ω
R24	20K POT
R25	2K POT
R26	470Ω ½W
R27	2K
R28	470Ω ½W
R29	2K
R30	100K
R31	4.7Ω
R32	4.7Ω
R-33	220Ω
R34	2K

IC1 SG1524

PC-123

Deflection Amp.

FEEDBACK RESISTOR
.17Ω (3-.5Ω)

1	SWEEP IN
2	SWEEP (CAP) OUT
3	Feedback — HIGH SIDE
4	+35
5	NPN Bases
6	PNP Bases
7	−35V
8	
9	" "

10	
11	"
12	
13	PNP
14	
15	
16	Yoke
17	GND

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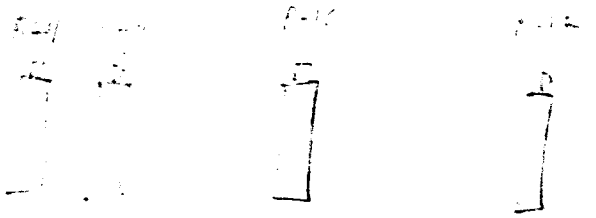
DC-123

Deflection Amp alignment

power off
adjust R12 CW all the way. Then face east, kneel down

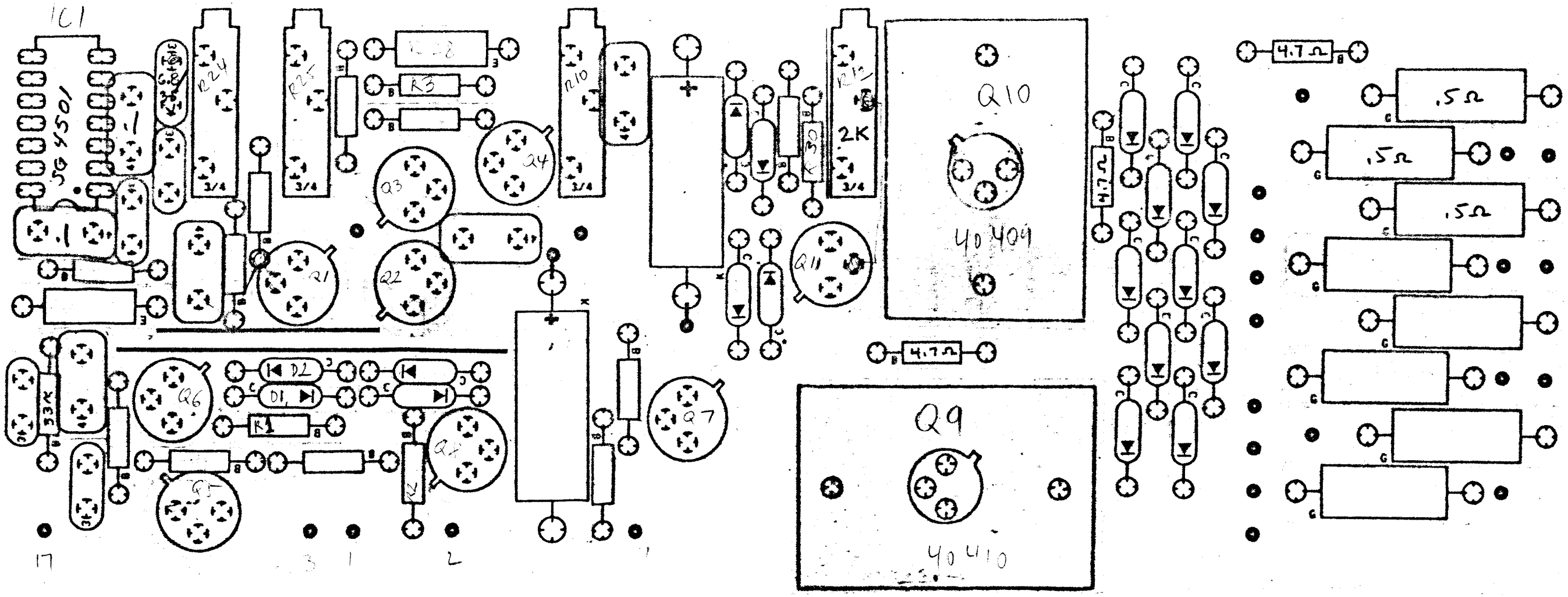
power on
adjust R25 for gain (signal on pin 1 only)

adjust R10 with signal on pins 1 and 2 for Null
adjust R12 ccw for no crossover and no oscillation
adjust R24 for centering picture
when brown, remove from heatsink

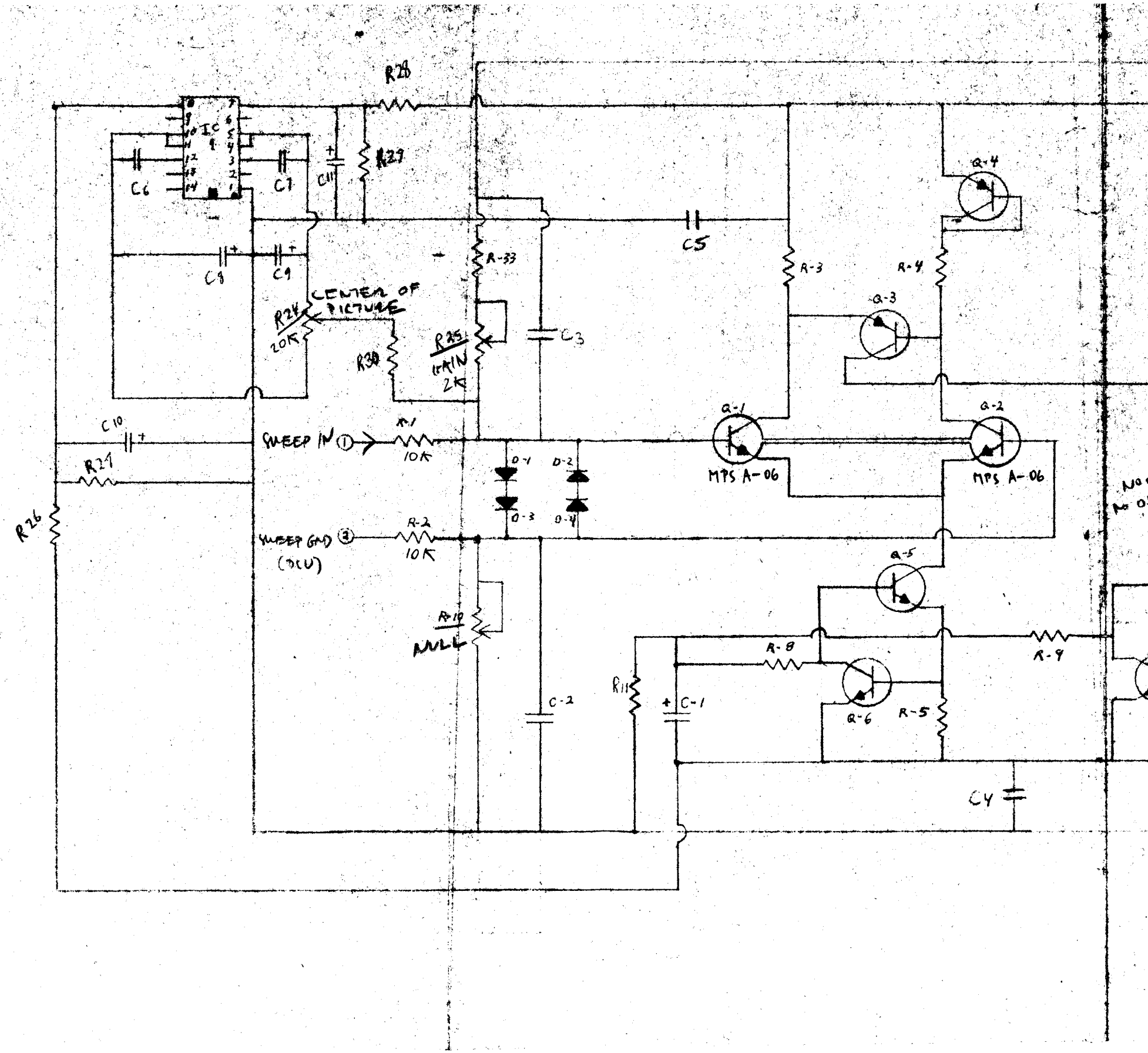


.25 Ω FEEDBACK SHUNT: 1 AMP = 250 MV
4 AMPS = 1 VOLT

HCS
14



PC R3 Deflection Amps


R26
IC 1
C6
C7
C11
R29
C9
C9
CENTER OF PICTURE
R24
20K
R30
R25
GAIN
2K
R-33
C5
C3
R-3
R-4
Q-4
Q-3
C10
R27
SWEEP IN ①
R1
10K
D-1
D-2
D-3
D-4
Q-1
MPS A-06
Q-2
MPS A-06
R26
SWEEP GND ③
(PCU)
R-2
10K
R10
NULL
C-2
R11
C-1
Q-5
R-8
R-9
Q-6
R-5
C4

PC 123

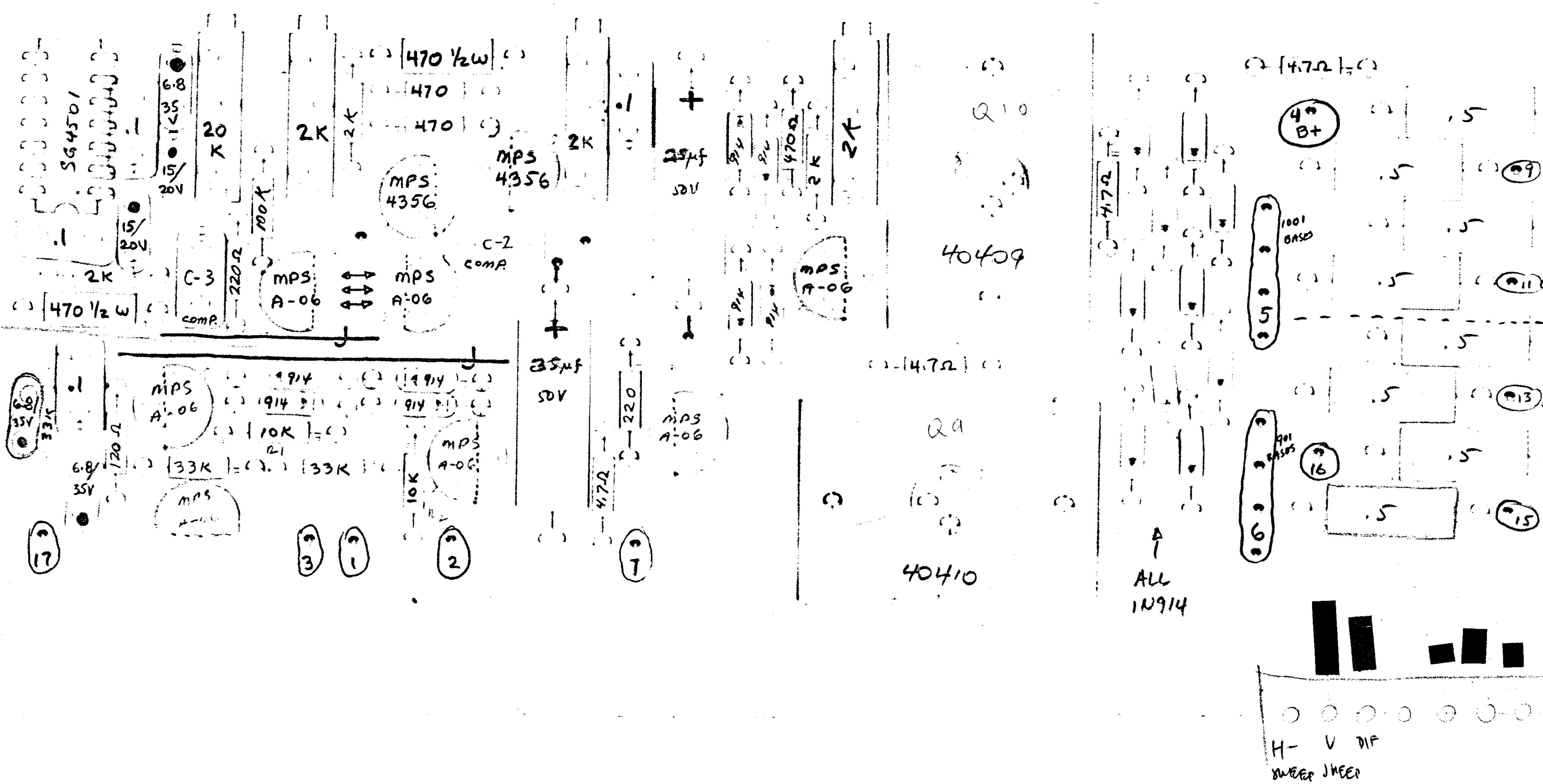
C5
R-3
R-4
Q-4
Q-3
C3
Q-1
Q-2
MPS A-06
MPS A-06
D-2
D-4
Q-5
R-8
R-9
Q-6
R-5
C-2
R11
C-1
C4
R31
+35V
4
5
NPN BASES MJ1001
D9
D10
D11
D12
D13
D14
D15
D16
D17
D18
PNP BASES MJ 901
6
40409
Q-10
R-13
R-30
D5
D6
R15
Q11
D7
D8
R12
No CROSSOVER
No OSCILLATION
Q-7
Q-9
40410
R14
Q-8
R-6
R32
7
-35V
C14
17
GND
C15
NPN EMITERS (MJ 1001)
8
7
10
11
R16
R17
R18
R19
16
YOKE OUT
R20
R21
R22
R23
12
13
14
15
PNP EMITERS MJ 901
3
FEEDBACK RESISTOR HIGH SIDE
PC-123
DEFLECTION AMP.
HCS 23

PC-123

TERMINALS:

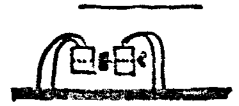
1. SWEEP IN
2. SWEEP (DCU) GND
3. FEEDBACK RESISTOR HIGH SIDE
4. +35V
5. NPN BASES (MJ 1001)
6. PNP BASES (MJ 901)
7. −35V
8-9-10-11 NPN EMITTERS (MJ 1001)
12-13-14-15 PNP EMITTERS (MJ 901)
16 - YOKE OUT
17 - GND

PC 123
DEFLECTION AMP.



NOTE: THESE ARE PUT IN WITH LONG LEADS, TURNED OVER AND MOUNTED FLAT-TO-FLAT THEN TIED TOGETHER WITH SILICONE GOOP BETWEEN THEM.

SIDE VIEW



170 71
277 72
448 .4?

PC-123

PC 123 DEFLECTION AMP.

TERMINALS:

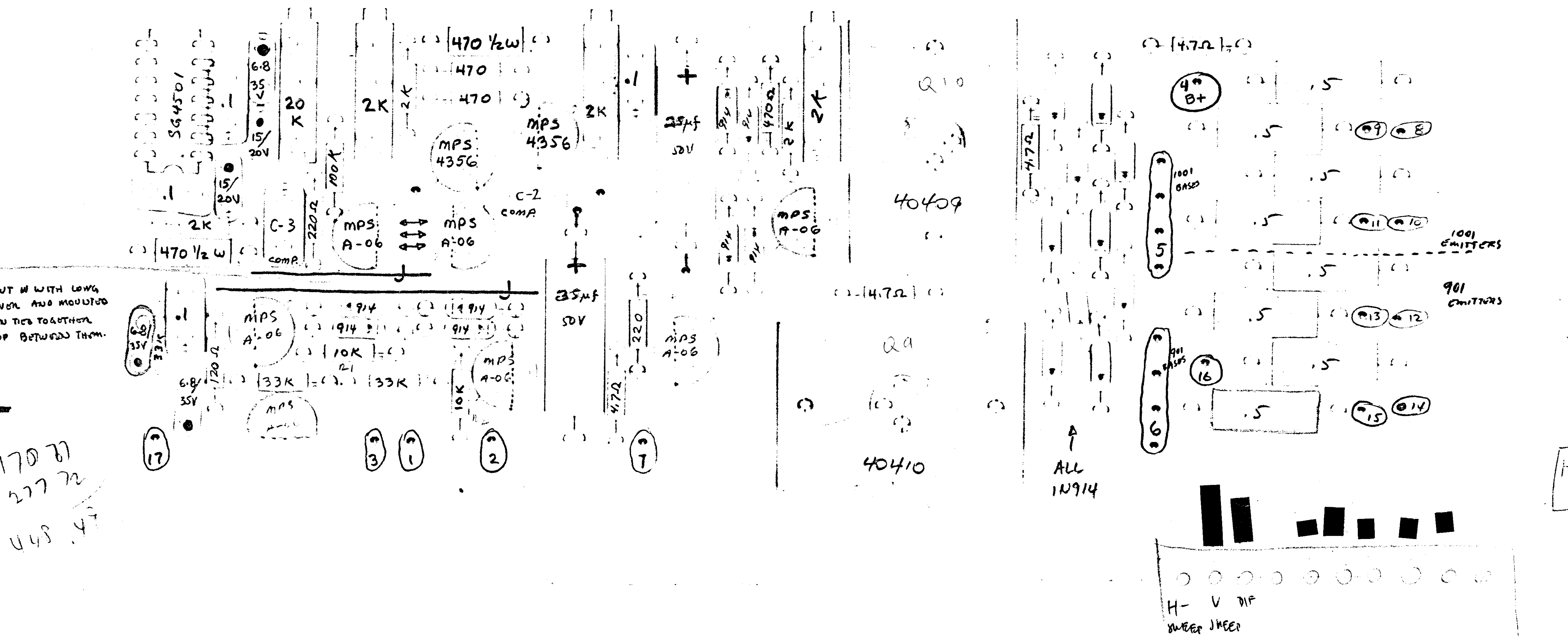
1. SWEEP IN
2. SWEEP (DCU) GND
3. FEEDBACK RESISTOR HIGH SIDE
4. +35V
5. NPN BASES (MJ 1001)
6. PNP BASES (MJ 901)
7. −35V

8-9-10-11 NPN EMITTERS (MJ 1001)

12-13-14-15 PNP EMITTERS (MJ901)

16 - YOKE OUT

17 - GND



HC-125

[illegible]
[illegible]

- D-1 9.1V ZENER
- D-2 9.1V ZENER
- D-3 1N914
- D-4 "
- D-5 "
- D-6 "

- Q-1 [illegible]
- Q-2 [illegible]
- Q-3 [illegible]
- Q-4 [illegible]
- Q-5 [illegible]
- Q-6 [illegible]
- Q-7 [illegible]
- Q-8 40409
- Q-9 40410
- Q-10 [illegible]
- Q-11 [illegible]
- Q-12 [illegible]
- Q-13 [illegible]

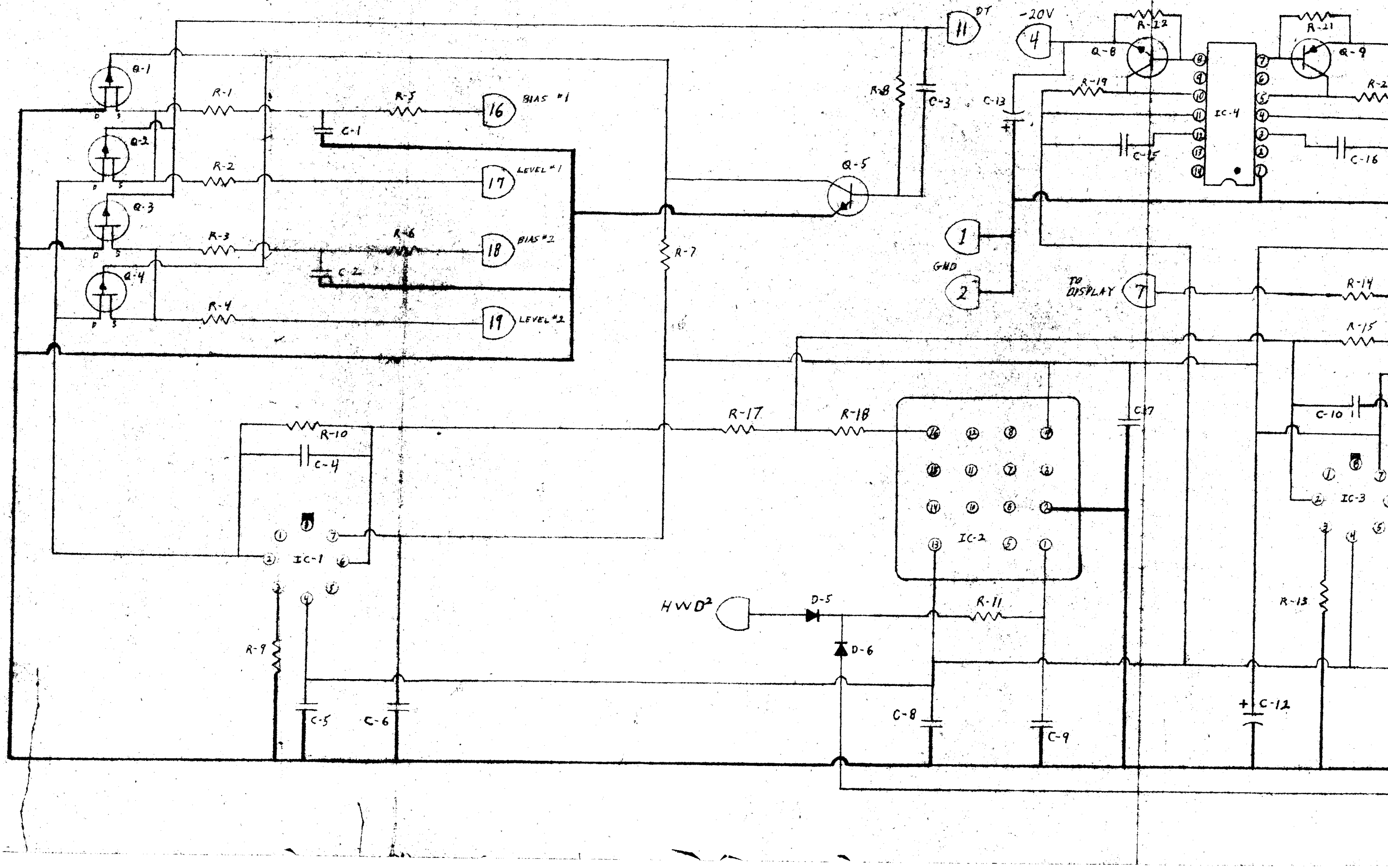
- IC-1 LM318 OP-AMP
- IC-2 CEL 2357 [illegible]
- IC-3 LM318 OP-AMP
- IC-4 [illegible]
- IC-5 2013 MULTIPLIER

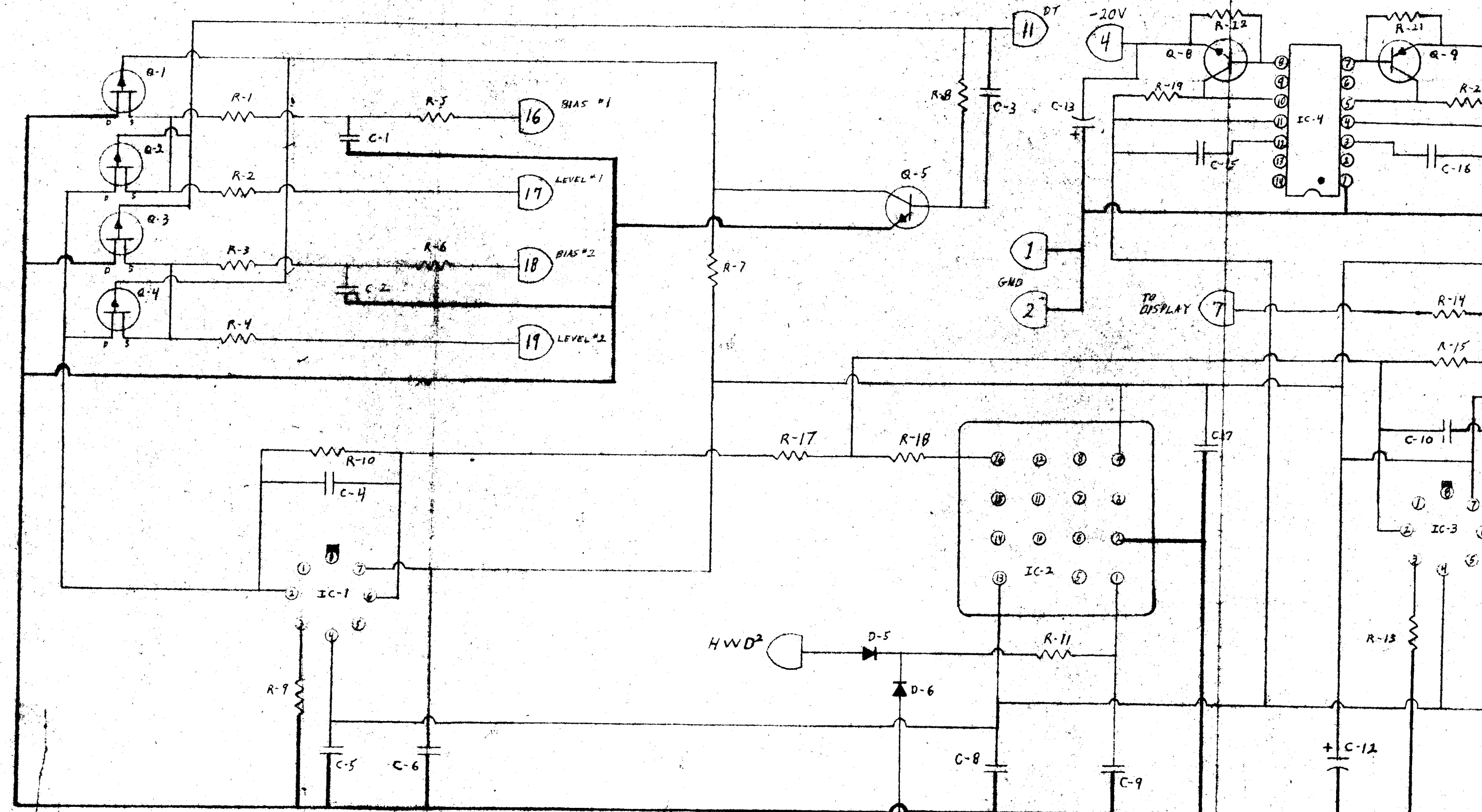
C-1	.1 uf
C-2	.1 [illegible]
C-3	100 PF
C-4	5 PF
C-5	.1
C-6	.1
C-7	.1
C-8	.1
C-9	.01
C-10	1 PF
C-11	15 uf 20 V
C-12	15 uf 20 V
C-13	7 uf 35 V
C-14	7 uf 35 V
C-15	.1 uf
C-16	[illegible] uf
C-17	10 uf 20 V
C-18	"
C-19	"
C-20	"
~~C-21~~	~~[illegible]~~
~~C-22~~	~~[illegible]~~

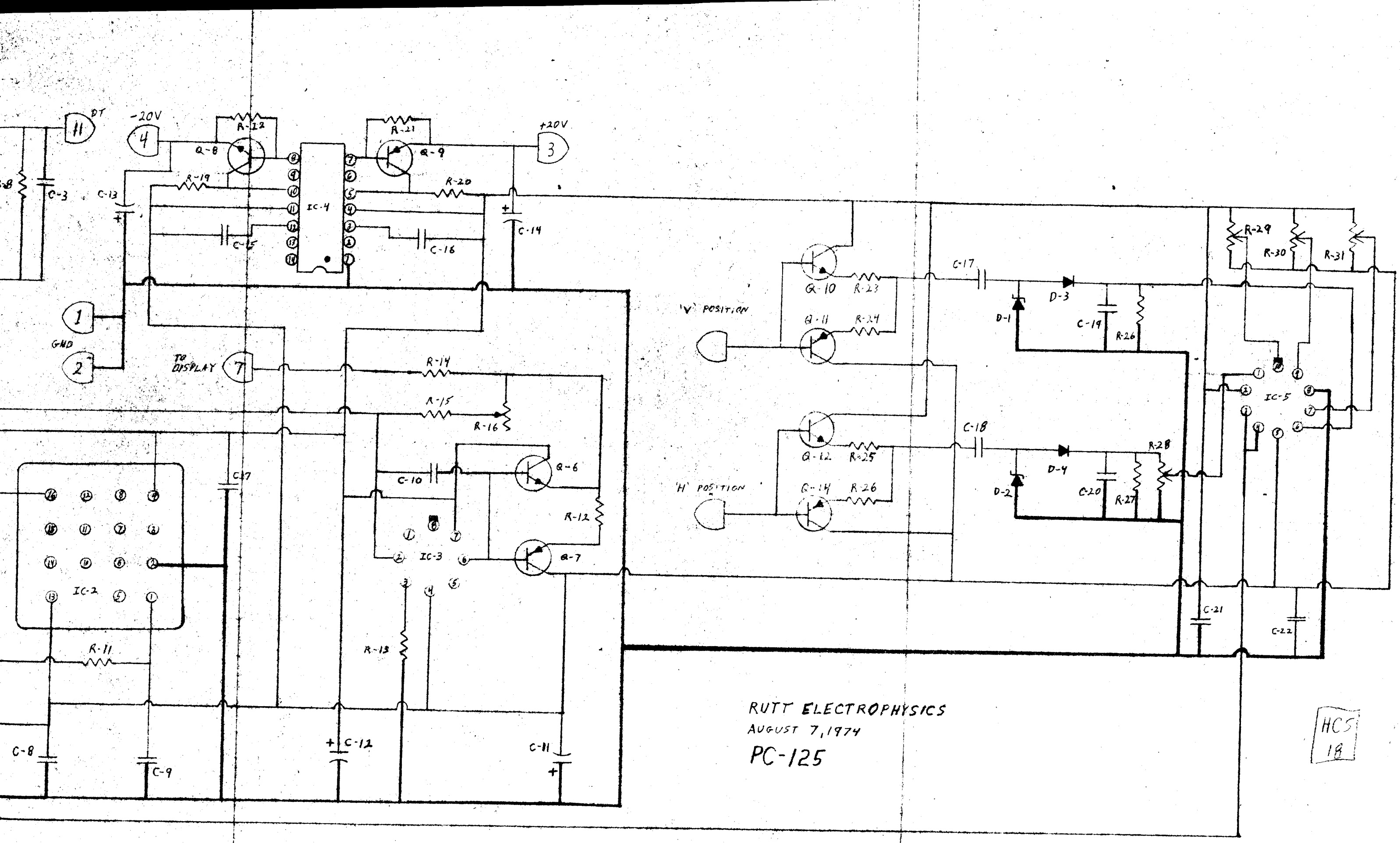
ALL CAPS CERAMIC OR TANTALUM

R-1	8.2K
R-2	[illegible]
R-3	[illegible]
R-4	[illegible]
R-5	1K
R-6	1K
R-7	10K
R-8	100K
R-9	4.7K
R-10	22K
R-11	4.7K
R-12	10 [illegible]
R-13	2.2K
R-14	7 [illegible]
R-15	[illegible]
R-16	100K POT
R-17	33K
R-18	2K
R-19	DALE
R-20	[illegible]
R-21	[illegible]
R-22	[illegible]
R-23	1K
R-24	1K
R-25	1K
R-26	1K
R-26	10K
R-27	10K
R-28	1 MEG [illegible]
R-29	[illegible]
R-30	[illegible]
R-31	[illegible]

HCS 34


Q-1
Q-2
Q-3
Q-4
D
S
R-1
R-2
R-3
R-4
R-5
R-6
C-1
C-2
16
BIAS #1
17
LEVEL #1
18
BIAS #2
19
LEVEL #2
R-7
Q-5
R-8
C-3
11
DT
4
-20V
R-12
Q-8
R-19
C-13
IC-4
R-21
Q-9
C-15
C-16
1
GND
2
TO DISPLAY
7
R-14
R-15
C-10
IC-3
R-13
R-17
R-18
C-17
IC-2
R-10
C-4
IC-1
R-9
C-5
C-6
HWD
D-5
D-6
R-11
C-8
C-9
C-12


Q-1
Q-2
Q-3
Q-4
R-1
R-2
R-3
R-4
R-5
R-6
C-1
C-2
16
BIAS #1
17
LEVEL #1
18
BIAS #2
19
LEVEL #2
R-7
Q-5
R-8
C-3
11
DT
-20V
4
R-22
Q-8
R-19
C-13
IC-4
C-15
R-21
Q-9
R-20
C-16
1
GND
2
TO DISPLAY
7
R-14
R-15
C-10
IC-3
R-13
R-10
C-4
IC-1
R-9
C-5
C-6
R-17
R-18
IC-2
C-17
HWD
D-5
D-6
R-11
C-8
C-9
C-12

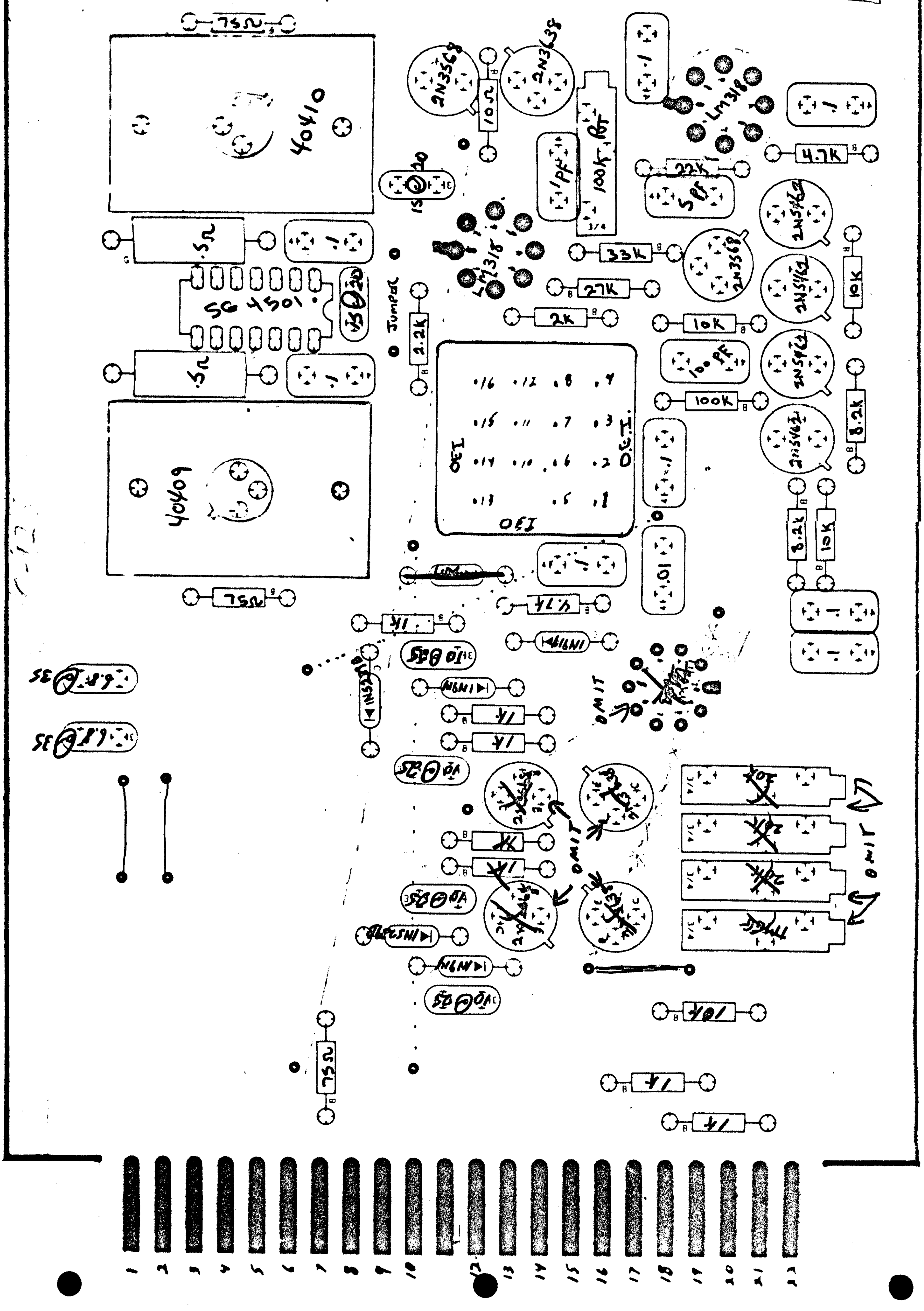


RUTT ELECTROPHYSICS
AUGUST 7, 1974
PC-125

HCS
18

PC-125

HCS 45



40410
40409
SG 4501
2N3568
2N3638
LM318
100K POT
1PF
5PF
100PF
JUMPER
OEI
OMIT
1N914
10Ω
75Ω
.5Ω
4.7K
22K
33K
27K
2K
10K
2.2K
100K
8.2K
1K
.01
.1

PC-126

-1	2013	C-1	.1μf CER	R-1	20K POT DEPTH² GAIN
-2	2013	C-2	.1μf CER	R-2	20K POT (H,X(w)) GAIN
-3	LM 318	C-3	15μf 20V TANT.	R-3	20K POT DEPTH ZERO
-4	LM 318	C-4	15μf 20V "	R-4	" OUTPUT OFFSET
-5	2013	C-5	.1μf Cer	R-5	" JUMPER ZERO
-6	SG-4501	C-6	.1μ Cer	R-6	" HEIGHT ZERO
1	MM 4040?	C-7	6.8μf 20V	R-7	" OUTPUT OFFSET
2	MM 4040?	C-8		R-8	" WIDTH ZERO
D-1	IN914			R-9	20K 5%
D-2	"			R-10	10K
				R-11	20K 5%
				R-12	10K
				R-13	20K 5%
				R-14	10K 5%
				R-15	20K 5%
				R-16	20K POT OUTPUT GAIN
				R-17	DEPTH OUT ZERO
				R-18	OUT ZERO
				R-19	H W OUT ZERO
				R-20	.5Ω Pak
				R-21	.5Ω Pak
				R-22	75Ω
				R-23	75Ω

HCS
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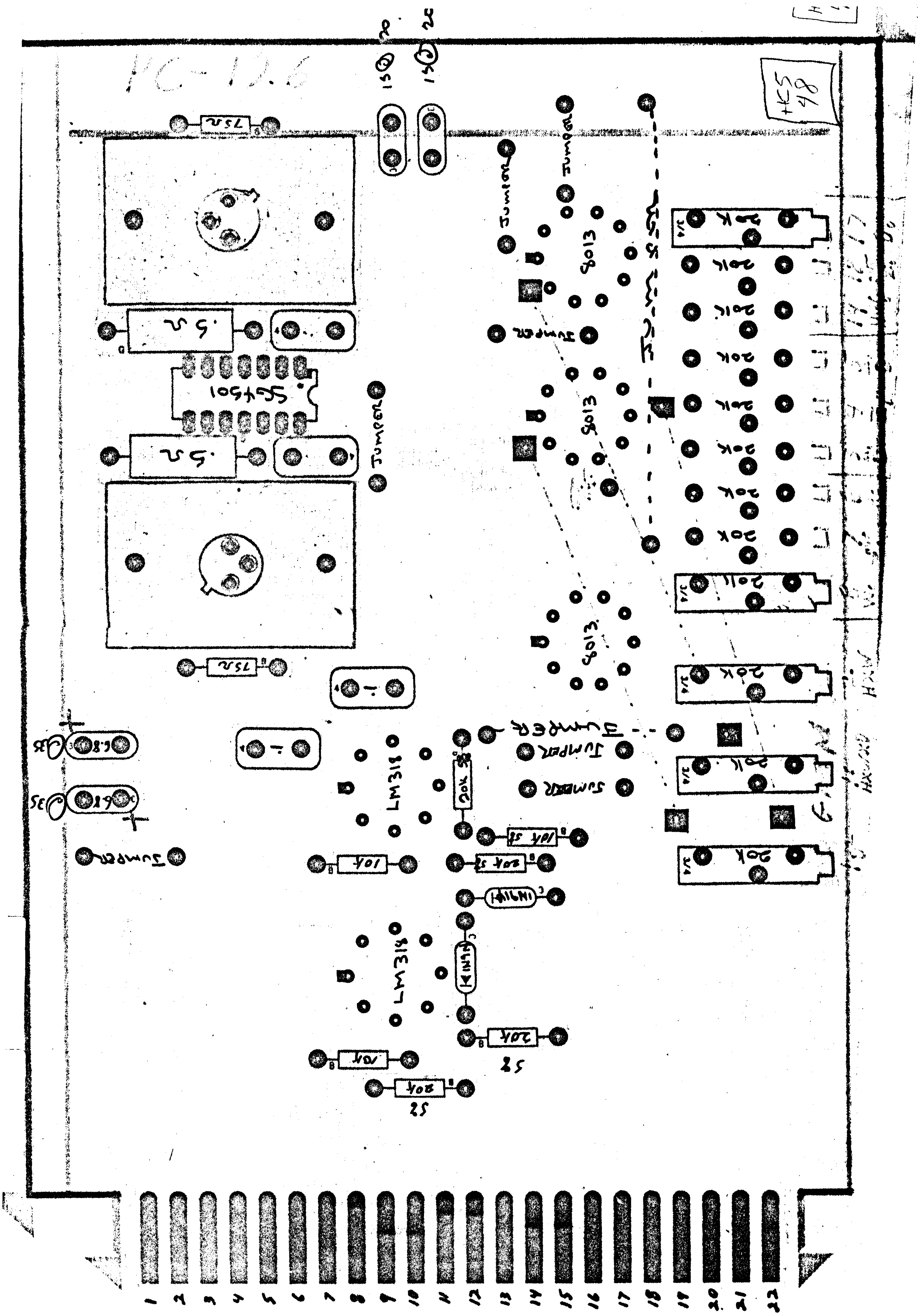
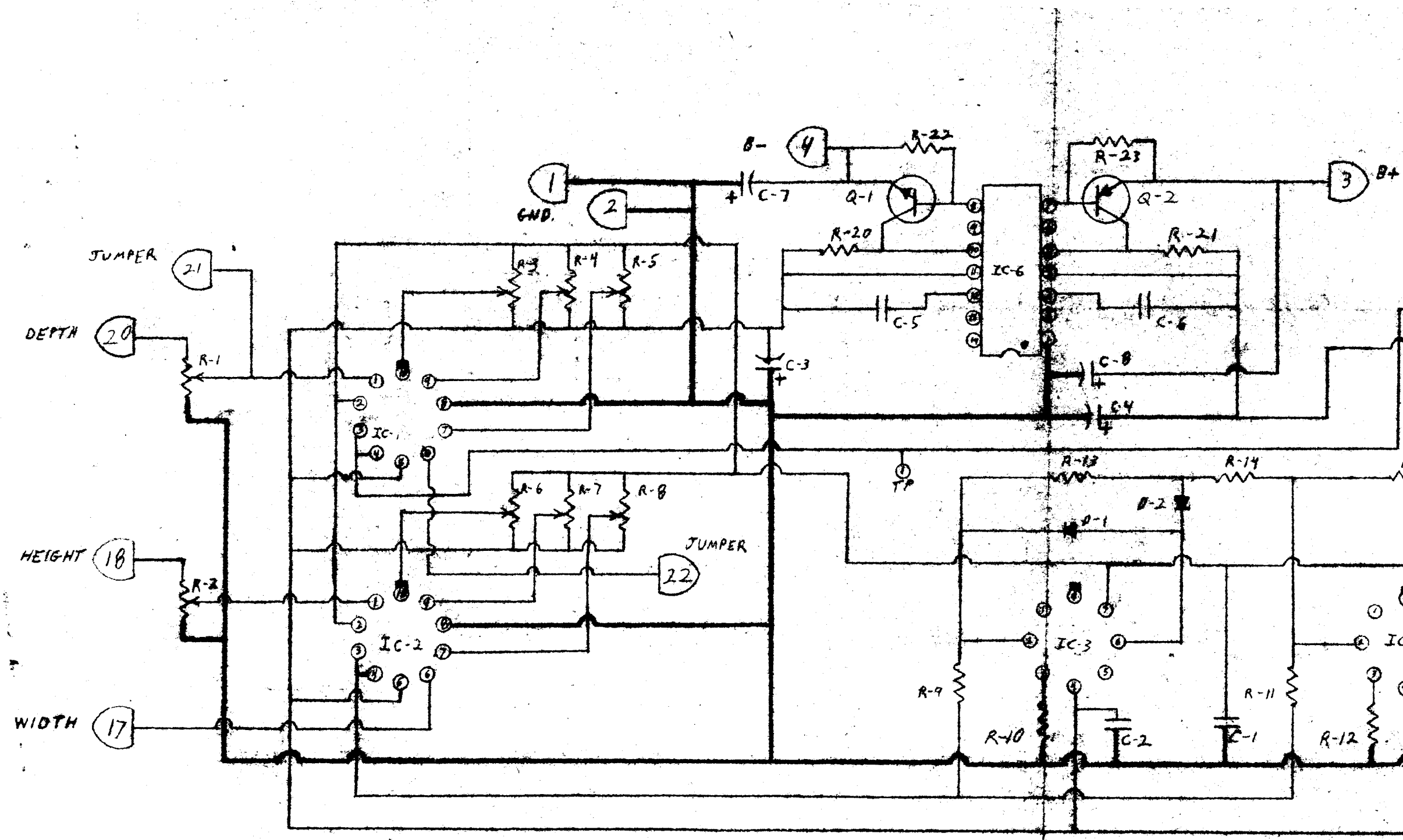
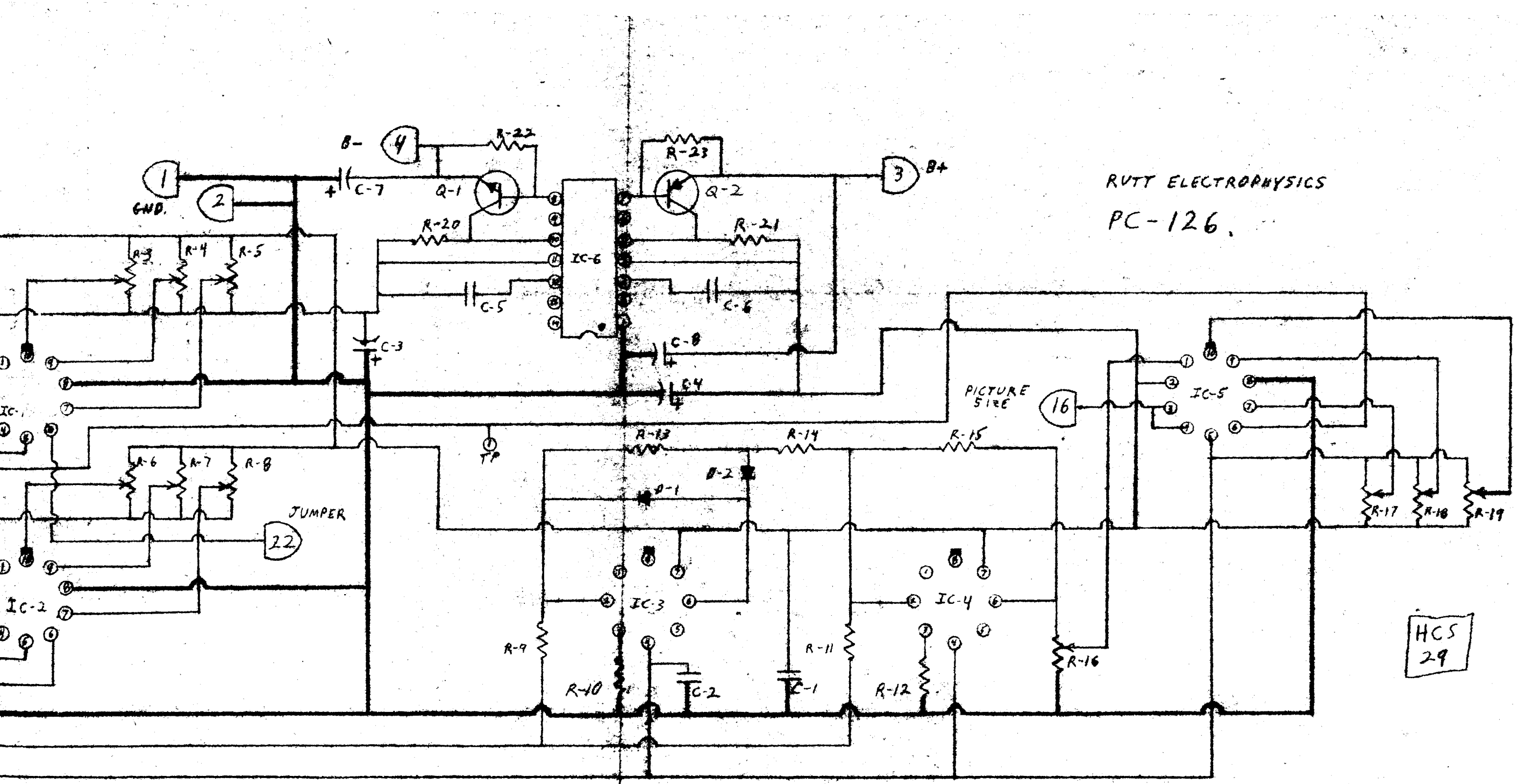

PC-12.6
LM318
LM318
JUMPER
20K
10K

RVTT ELEC
PC-126



RVTT ELECTROPHYSICS

PC-126.



HCS
29

RUTT ELECTROPHYSICS
21-29 West 4th Street, New York, N.Y., 10012 (212) 982-8300

PC 127A

JAN 29, 75

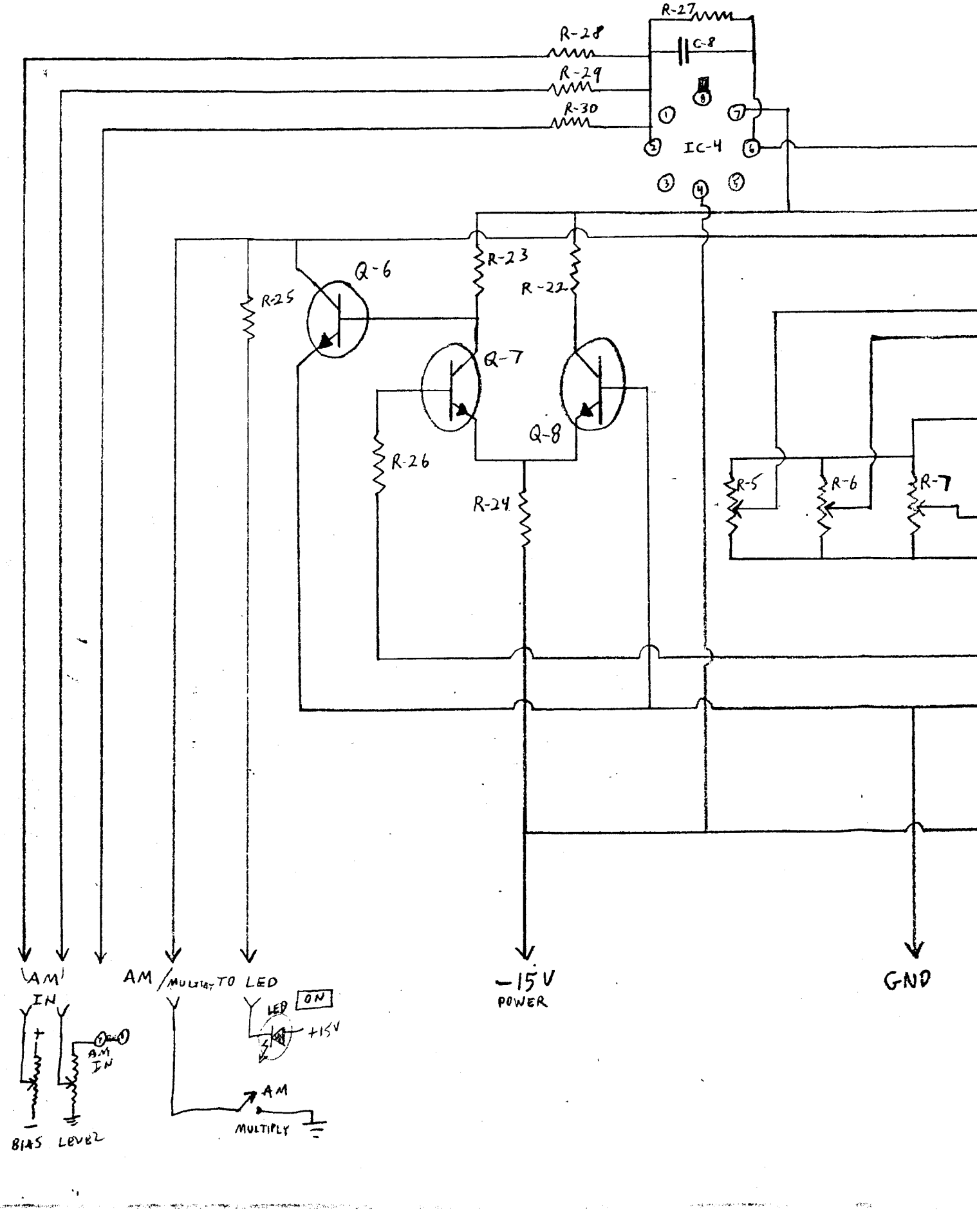
IC-1	MC 1494
IC-2	LM 318
IC-3	LM 318
IC-4	LM 318

D-1	IN 914
D-2	IN 914
D-3	IN 914
D-4	IN 914
D-5	IN 914
D-6	IN 914

Q-1	NPN 2N 3568
Q-2	PNP 2N 3638
Q-3	NPN 2N 3568
Q-4	PNP 2N 3638
Q-5	FET 2N 5462
Q-6	NPN 2N 3568
Q-7	NPN 2N 3568
Q-8	NPN 2N 3568

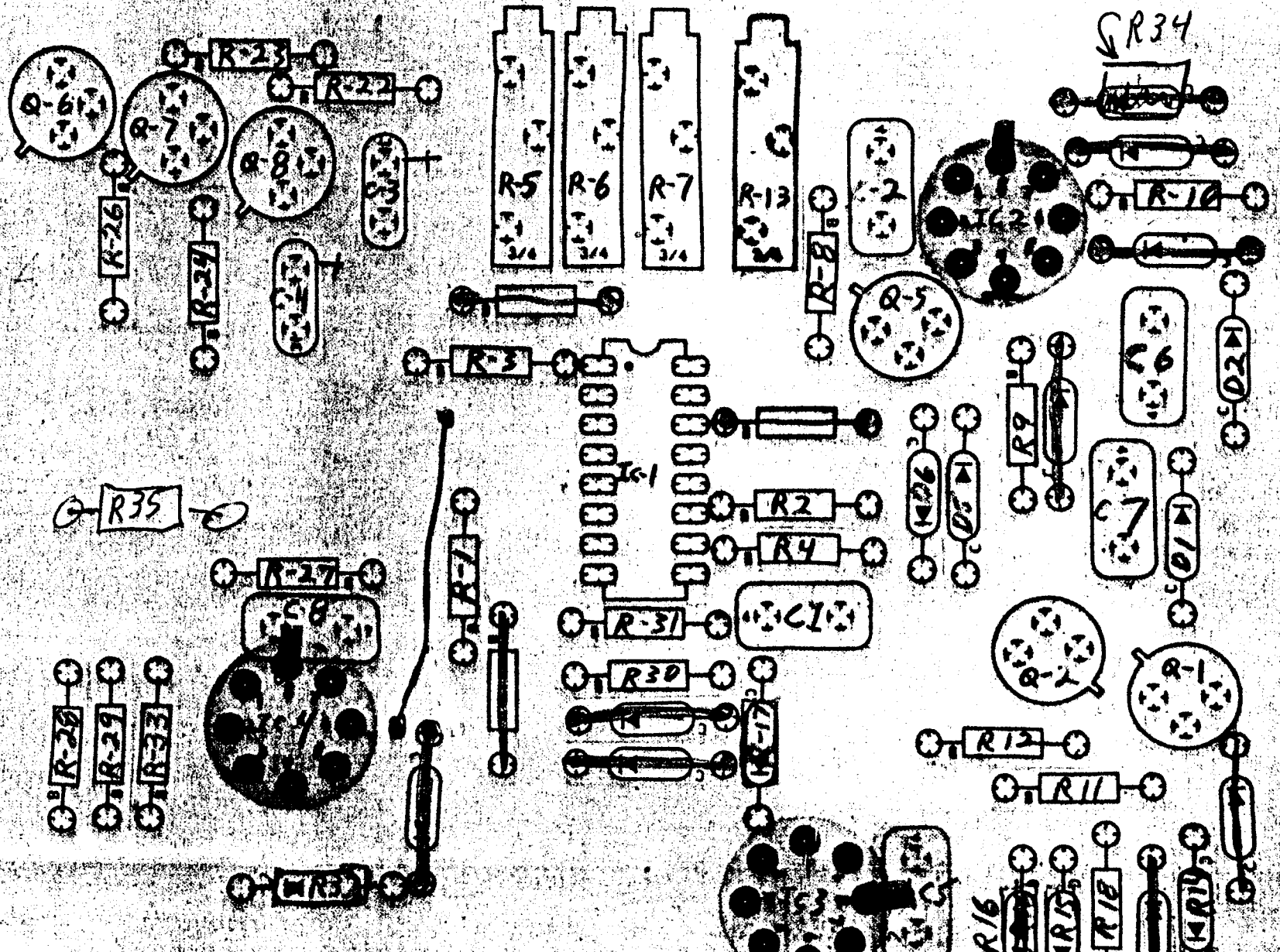
C-1	10 PF
C-2	10 PF
C-3	15 of 20V
C-4	15 of 20V
C-5	10 pF
C-6	.1 cer
C-7	.1 cer
C-8	10 PF
C-9	.1 cer

R-1	27 K
R-2	15 K
R-3	12 K
R-4	510 Ω
R-5	20K pot
R-6	20K pot
R-7	20K pot
R-8	47K
R-9	10K
R-10	10K
R-11	10Ω
R-12	10Ω
R-13	20K pot
R-14	150 Ω
R-15	10K
R-16	10K
R-17	10K
R-18	10K
R-19	10Ω
R-20	10Ω
R-21	150Ω
R-22	6.8K
R-23	20K
R-24	6.8K
R-25	
R-26	10K
R-27	20K
R-28	15K
R-29	10K
R-30	2.2K
R-31	10K
R-32	4.7K
R-33	omit
R-34	
R-35	10K
R-36	4.7K


R-27
R-28
C-8
R-29
R-30
IC-4
Q-6
R-23
R-22
R-25
Q-7
Q-8
R-26
R-24
R-5
R-6
R-7
AM IN
AM / MULTIPLY
TO LED
LED
ON
+15V
AM IN
AM
MULTIPLY
BIAS
LEVEL
-15V
POWER
GND

PC-127A

JAN 29, 75

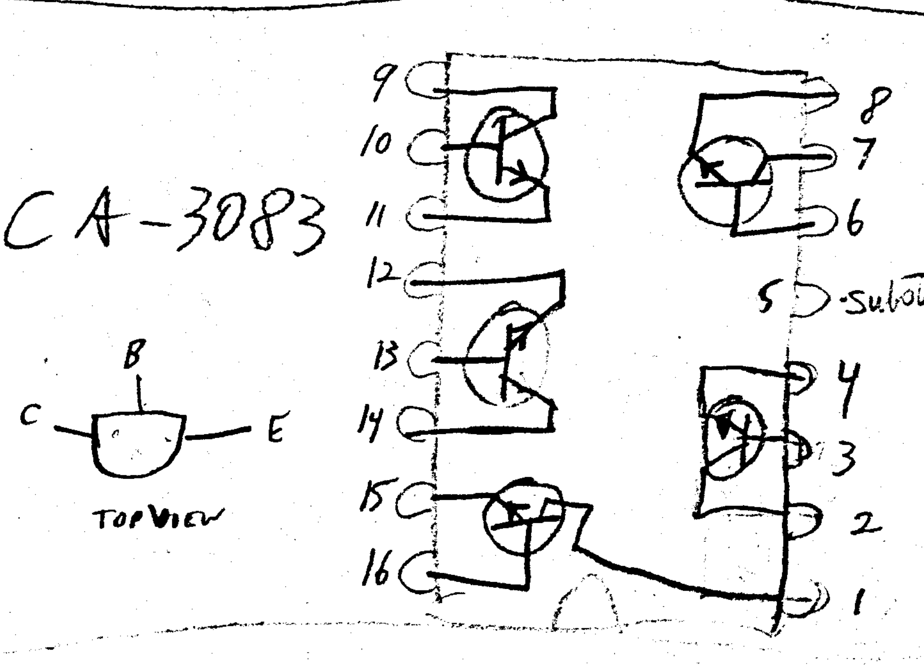


PC-132 VIDEO DRIVER CORRECTIONS

1) R30, IC-10 pin 2, Q-4 Base ARE NOT SUPPOSED TO GO [illegible] +15

2) IC-10 Pin 7 & OTHER COMPONENTS ON SAME WIRE SHOULD ALSO GO TO −15V

3) R-44 IS NOT GROUNDED



4) IC2 Pin 2 + 4 are MESSED UP
CONNECT PIN 4 TO B−
CUT B− FROM PIN 2 & CONNECT PIN 2 TO D5+C3

OVER

15) ADD 1PF CAP TO IC-8 PIN 2-6

16) ADD 33Ω RESISTORS INSTEAD OF JUMPERS ON + & − 28V TO SG4501

17) PUT 47Ω Resistor IN SERIES WITH CATHODE

18) ADD 10K Res IN SERIES W/ G-2

19) Reduce VALUE of R61

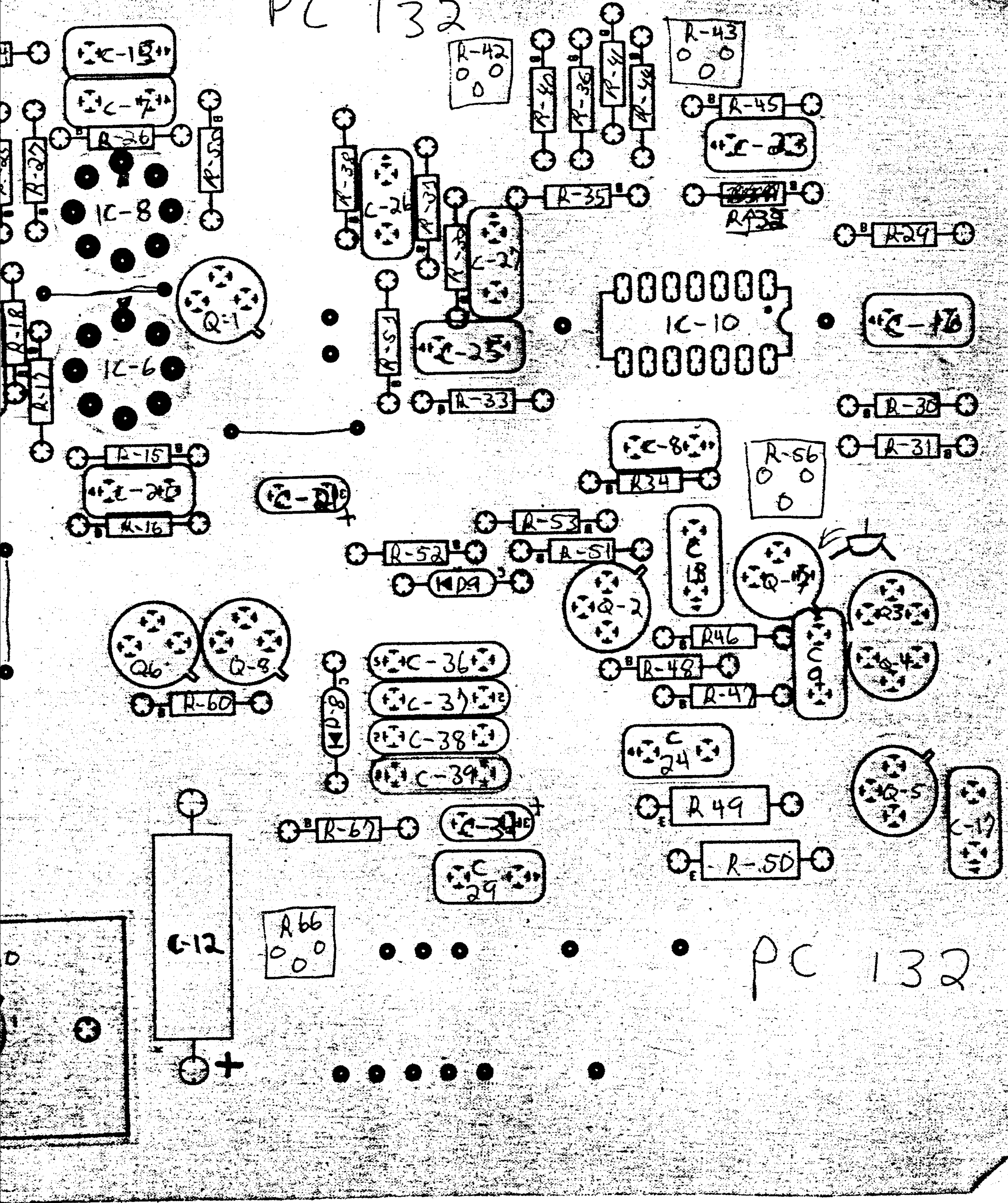
20) PUT LIMIT POT ON INTENSITY (OCU) & BIAS POT TO SET EXT INT. AT SPECIFIC RANGE

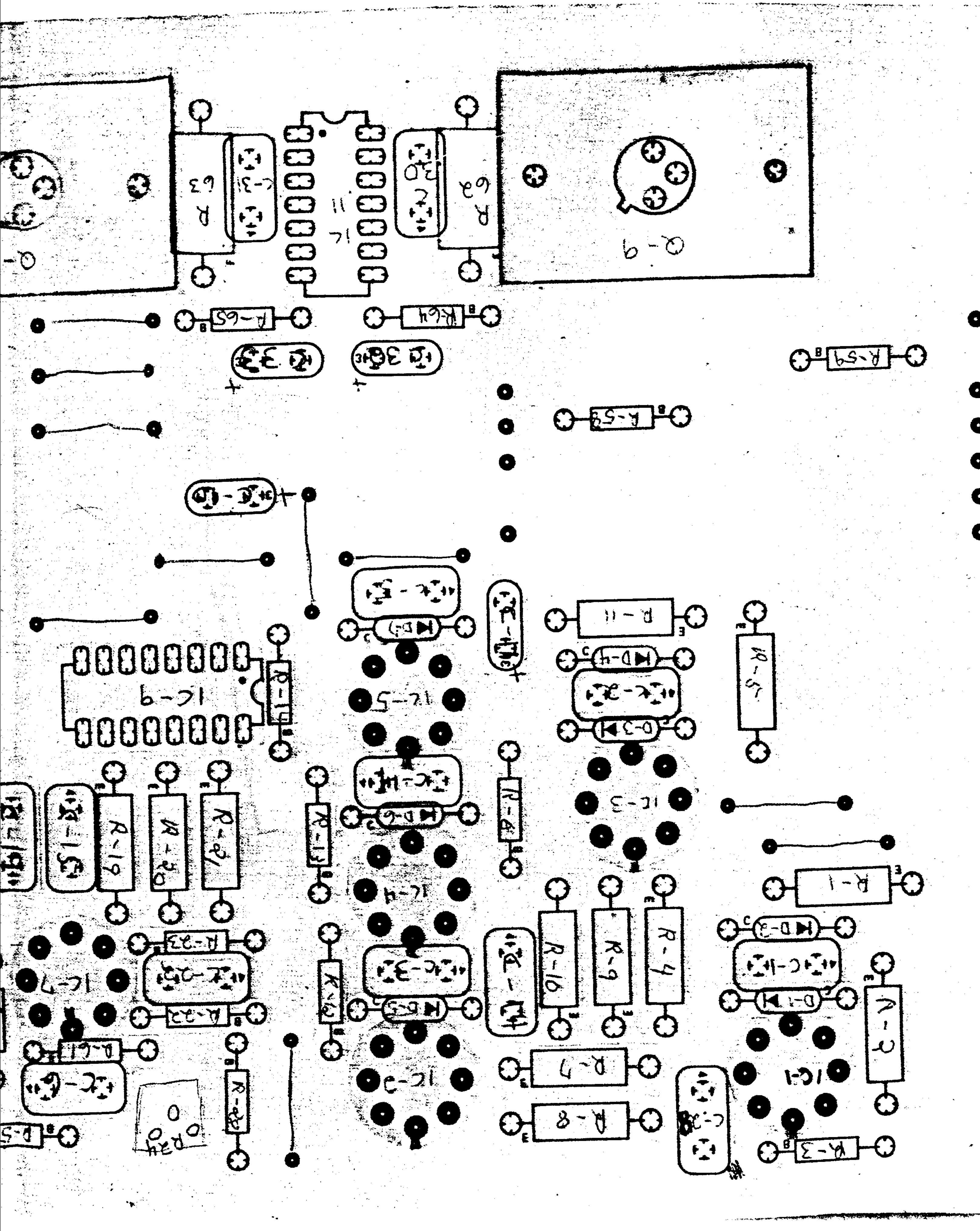
21) ADD Resistor in series with +45V in

21) Change G-1 FROM 0 TO −28 TO ±15

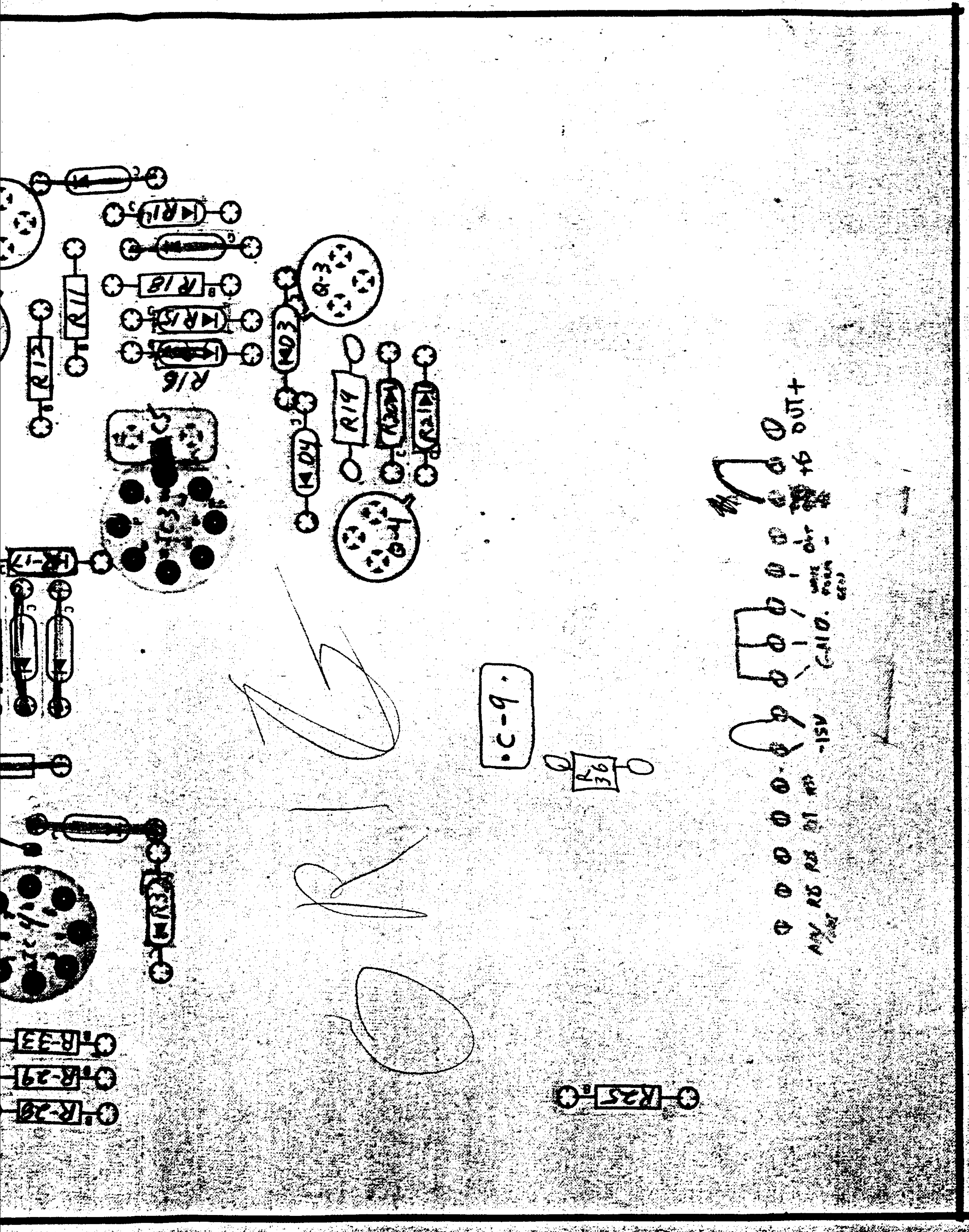
22) correct R8 & R10
THEY GO TO WRONG POINTS ON IC-4 & IC-3

PC 132


C-15
C-7
R-26
R-27
R-50
IC-8
R-18
R-17
IC-6
Q-1
R-15
C-20
R-16
R-38
C-26
R-37
R-32
C-27
R-51
C-25
R-33
R-42
R-40
R-36
R-41
R-44
R-43
R-45
C-23
R-35
R-39
R-29
IC-10
C-16
R-30
R-31
C-8
R34
R-56
C-21
R-53
R-52
R-51
D9
C 18
Q-2
Q-7
Q-3
R46
R-48
R-47
C 9
Q-4
Q6
Q-8
R-60
D-8
C-36
C-37
C-38
C-39
C 24
R 49
Q-5
C-17
R-67
C-34
C 29
R-50
C-12
R 66
PC 132



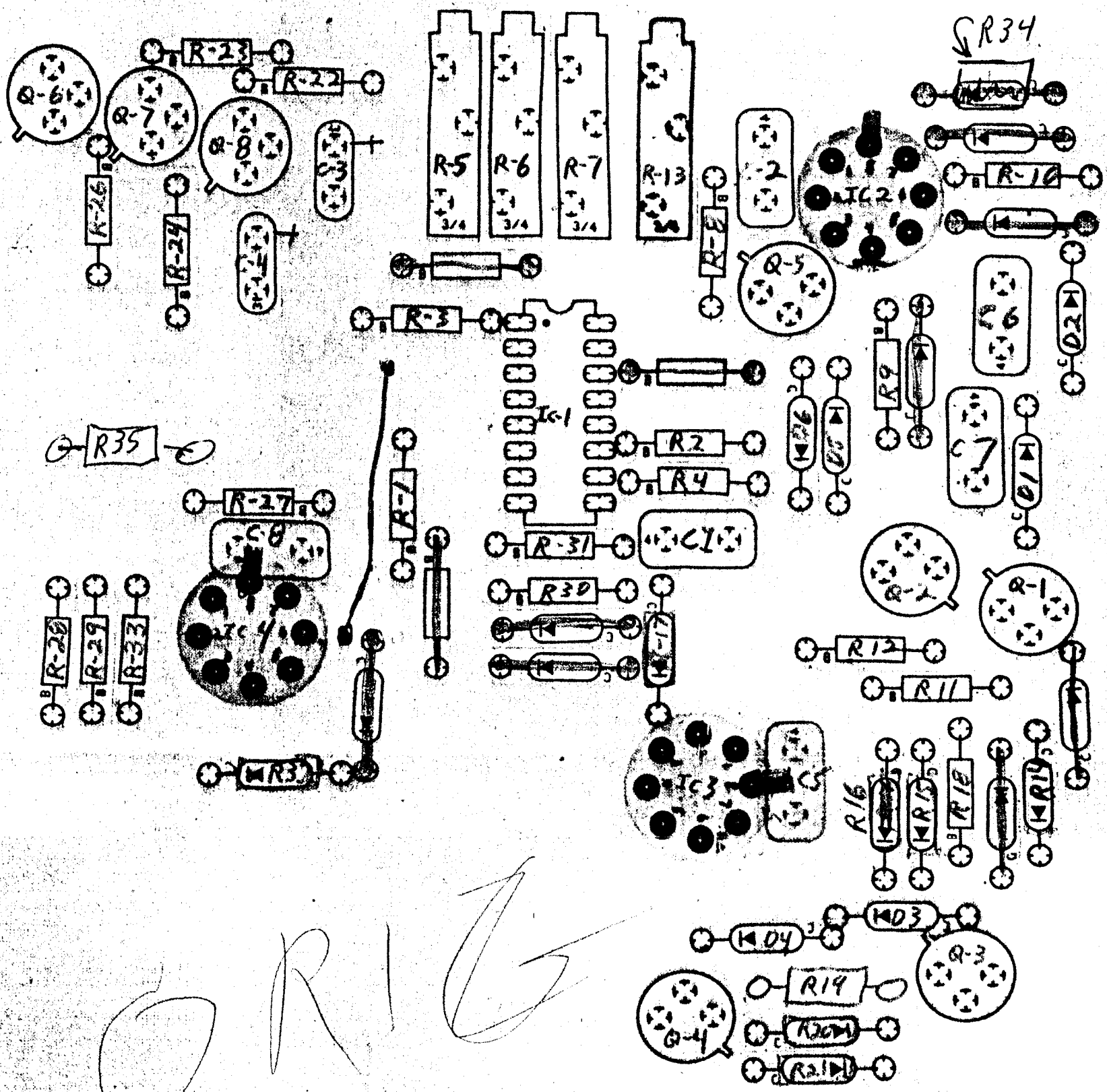
Q-9
IC-11
IC-9
IC-5
IC-3
IC-4
IC-7
IC-2
IC-1
R-1
R-4
R-7
R-8
R-9
R-11
R-16



R11
R12
R18
R15
R16
Q-3
D3
D4
R14
R19
IC3
Q-4
R-17
R-33
R-29
R-30
C-9
R 36
R25
-15V
OUT+
+6

PC-127A

JAN 29, 75



PC BOARD Number 132 - VIDEO DRIVER

Retyped 2/10/78
by Jeff Schier

Corrections to PC 132

1) R30, IC-10, and Q4 base; are not supposed to go to +15

2) IC-10 / Pin 7 and other components, on the same wire, should also go to -15 Volt

3) R44 is not grounded

4) IC-2 / Pin 2 and 4, are 'messed up'
   Connect Pin 4 to B-
   Cut B- from Pin 2 and reconnect Pin 2 to : D5 and C3

5) Put resistors in series with the +28Volt and -28 Volt to limit the 40409,40410 power dissipation.

6) Crossed off but was: 'Change c-21 to 0.1 uf cer,or 2 tantalums back to back'. This number is no longer in effect

7) Change R44 to 10k ohms, from 100k ohms (this change is noted on parts list)

8) Change R54 to 220k ohms (this change is noted on parts list)

9) Add 470k ohm resistor,from (C22, R28, R22 junction) to Pin2 of IC-8 . This offsets log circuit,to help linearize the Intensity Input.

10) Change R44 from 10k ohms to 4.7k ohms, (change noted on parts list).

    A) " White Stretch, is ' OFF' , when pot. is C.W.
    B) R46 and R47, control the gain of the Multiply amp. If gain is too high,(too much contrast),Raise their value (in proportion) , and lower C9 by the same proportion, and you will reduce gain.

11) Add 2.7 ohm resistor, in series with B-, to Q2, R51, C18 junction.

12) Change C-18 to 15 uf(microfarad) at 20 Volt, Tantalum. The plus(+) side is the ground side.

13) Change C16 to 15 uf (microFarad) at 25 Volt.

14) Omit C13 (be sure to change R27 ground.).

15) Add a 1 pf (picofarad) capacitor, between IC8/pins 2 and pin 6.

16) Add 33 ohm resistors, instead of jumpers, on the + and - 28 Volt lines, going to the SG4501 voltage regulator.

17) Place a 47 ohm resistor in series with the cathode.

18) Add a 10k ohm resistor in series with G-2

REVISED JAN 16, 1975 — [illegible]

PC 132

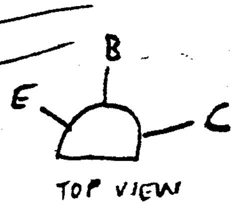
all 1/4 W 5% carbon unless marked

IC 1 - LM318H
2 - "
- "
- "
- "
- "
- "
- "
- CA3083 → ? 30183 (80V)
10 - MC1595 with heatsink

Q - 2N3568 or equiv
2 - 2N3646
- 2N5770 } Strapped together
- 2N5770 }
- 2N2219A
- 2N3646
7 - 2N5770
8 - 2N3646
D1 thru D7 - 1N914A

Note: Diode leakage must be less than 1 μA at 15V

D-8 1N914



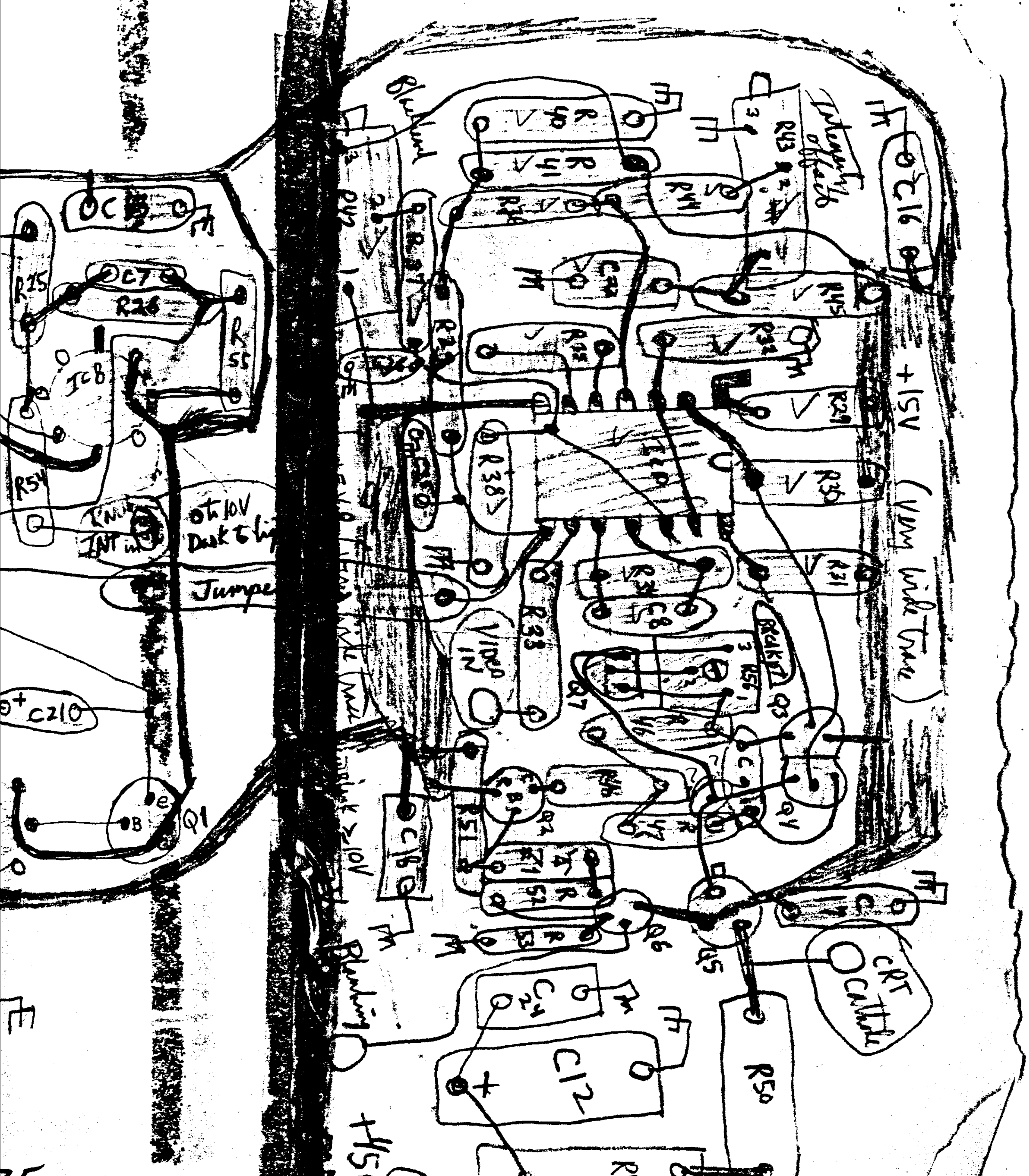
D-9 Zener 1N5248B

Resistor	Value
R1	10K 1%
2	10K 1%
3	4.7K
4	10K 1%
5	10K 1%
6	4.7K
7	10K 1%
8	5K 1%
9	10K 1%
10	5K 1%
11	5K 1%
12	510Ω } (470Ω)
13	510Ω } (470Ω)
14	510Ω } (470Ω)
15	18K
16	1K
17	4.7K
18	4.7K
19	20K 1%
20	20K 1%
21	10K 1%
22	100K
23	33K
24	10K trim
25	10K
26	10K
27	4.7K
28	4.7K
29	510Ω } all 510Ω or all 470Ω
30	510Ω
31	510Ω
32	510Ω
33	100Ω
34	220Ω
35	220Ω
36	1K
R37	1K
38	100Ω
39	1K
40	100Ω
41	1K
42	20K trim
43	20K trim
44	4.7K
45	10K
46	10Ω
47	150Ω
48	680Ω
49	510Ω 1/2 W (470)
50	510Ω 1/2 W (470Ω)
51	1K
52	1K
53	10K
54	220K
55	510Ω (470Ω)
56	1K trim
R57	75Ω
R58	1K
R59	10K
R60	10K
R61	2.7K

~~R57 2.2K~~

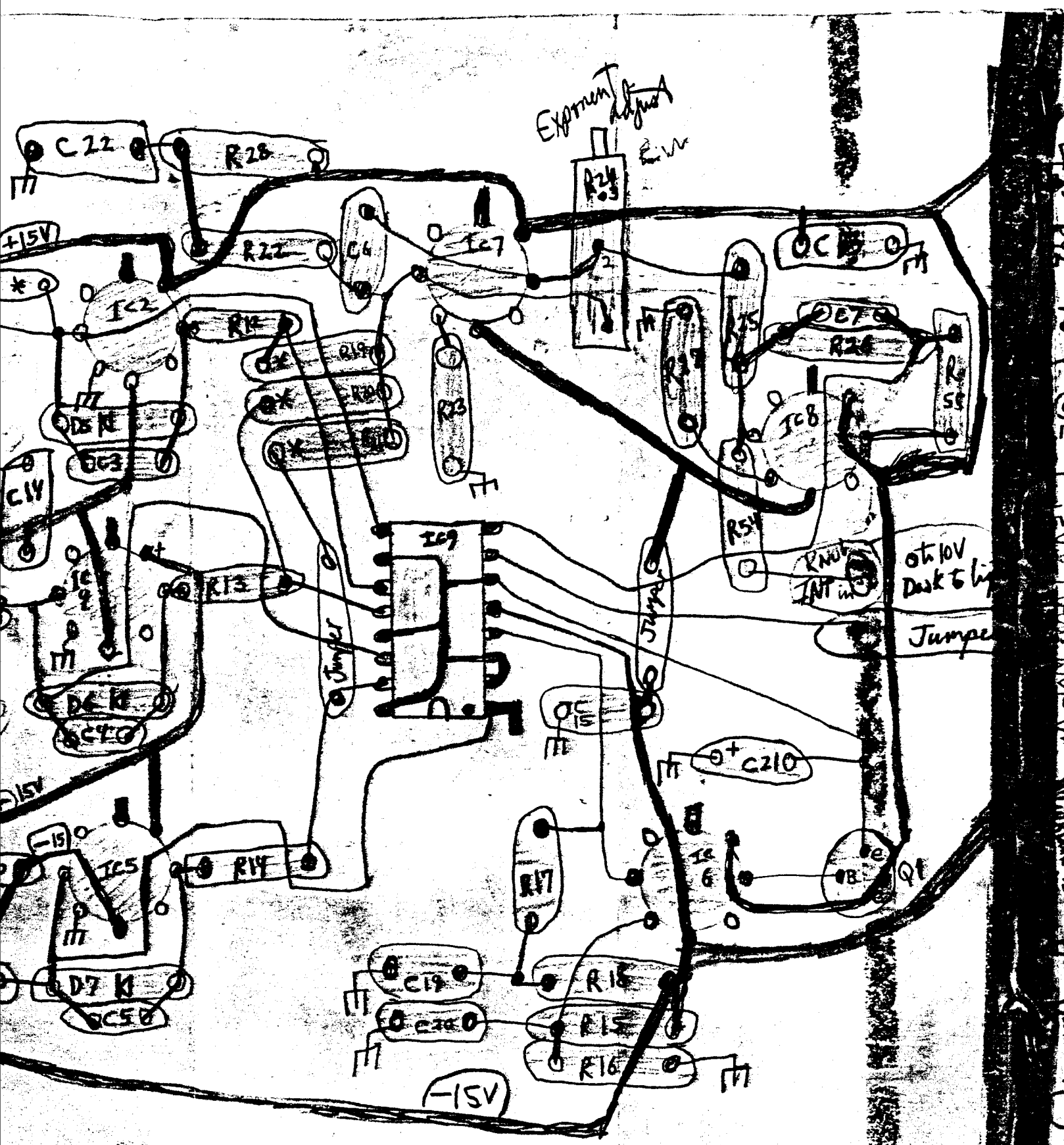
Capacitor	Value
C1	47pF (disks)
C2	47pF (disks)
3	47pF (disks)
4	47pF (disks)
5	47pF (disks)
6	10pF (disks)
7	10pF (disks)
8	100pF ✡ (disks)
9	100pF ✡ (disks)
10	15μF/20V } Tantalum
11	15μF/20V } Tantalum
12	22/50V
13	.1 } Ceramic
14	.1 } Ceramic
15	.1 } Ceramic
16	.1 } Ceramic
17	.1 } Ceramic
C18	.1 } Ceram
C19	.1 } Ceram
20	.1 } Ceram
21	15μF/20V (Tant)
22	.1 } Ceram
23	.1 } Ceram
24	.1 } Ceram
25	220pF DISK
26	220pF
C27	.1μF
C28	.1μF

COMP CAPS - ADD FOR HF BANDWIDTH

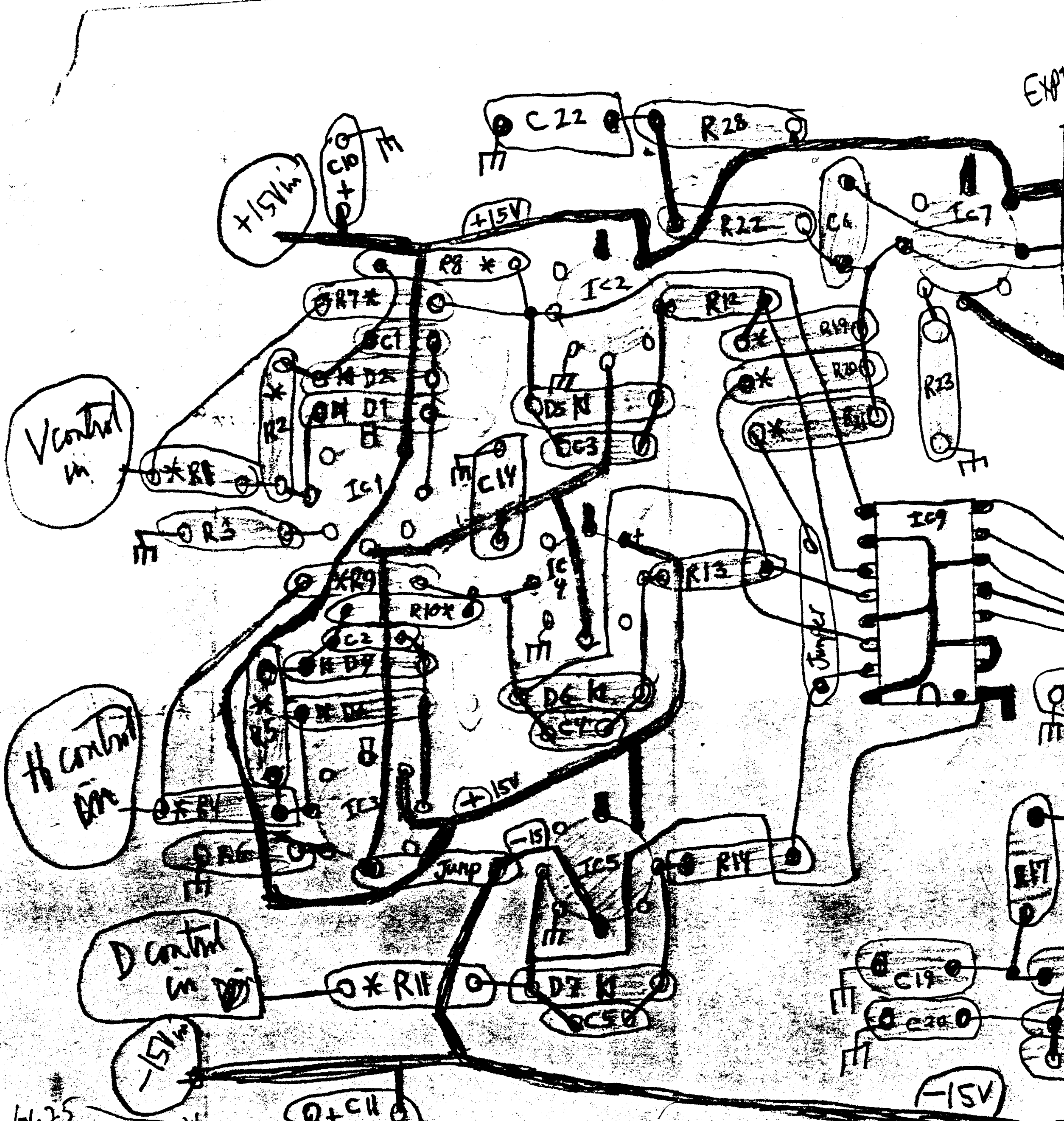


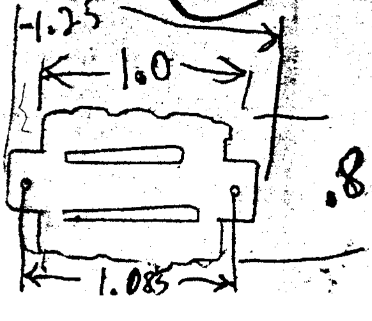
R15
C7
R26
R55
IC8
R54
Jumper
C21
Q1
C12
R50
R49
C16
+15V
CRT Cathode
Video In

75



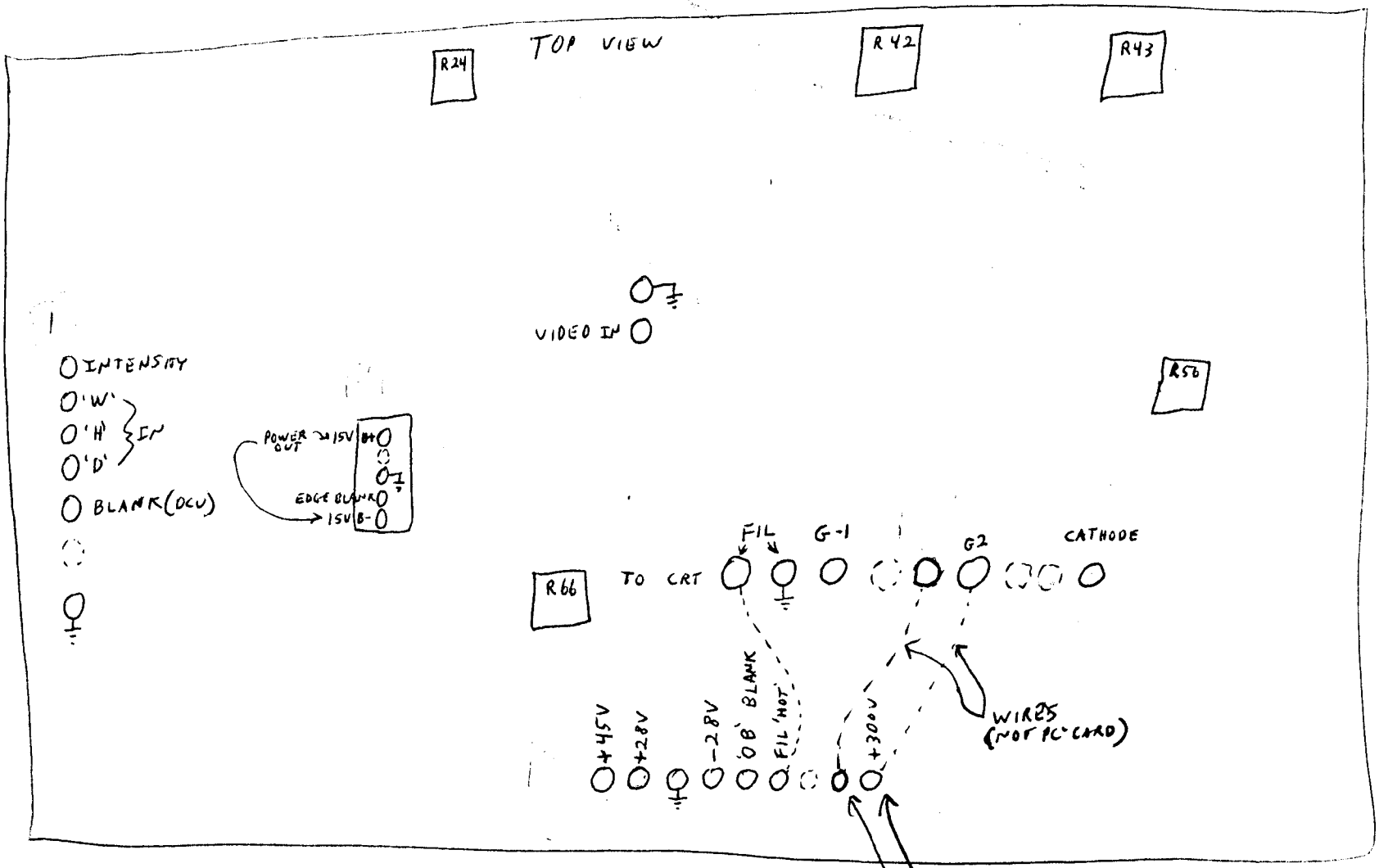
CRT DRIVER JAN 16/75


C22
R28
C10
+15V in
+15V
R22
C6
IC7
R8
R7
IC2
R12
R19
R20
R23
C1
D2
D1
D5
C3
V control in
R1
R2
IC1
C14
R3
IC9
R9
R10
IC4
R13
C2
D4
D3
R5
D6
C4
H control in
R4
IC3
+15V
-15
R6
Jump
IC5
R14
Jumper
R17
D control in
R11
D7
C5
C19
C20
-15V in
C11
-15V


1.25
1.0
.8
1.085

CRT DRIVER J

PC-132 CHICAGO



PC Board 132 - Video Driver - Corrections(conitnued)

2/10/78

Corrections- continued

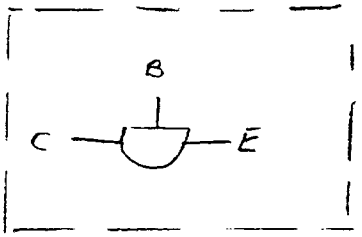
19) Reduce the value of R61

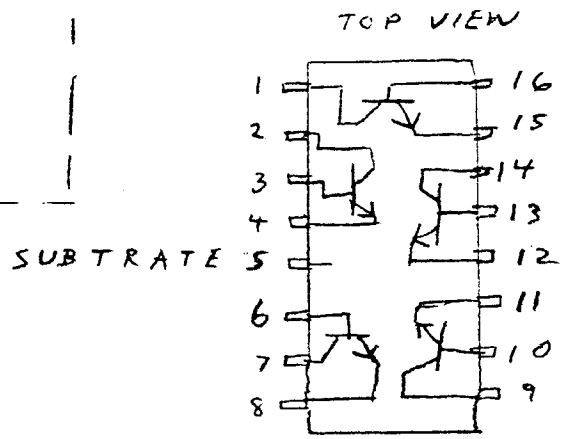
20) Put a limit potentiometer, on the intensity (DCU) , and bias potentiometer, to set Ext Int. at specific range

21) Add a resistor in series with the +45 Volt input.

Pinout for CA-3083

CA3083 - GENERAL PURPOSE, HIGH CURRENT NPN TRANSISTOR ARRAY





PC132 Parts List - High Resolution CRT Driver
with V,H,D^2 Correction

Revised Jan. 16, 1975 Retyped Jeffrey Schier 6/1/78

Note: All resistor values are 5% ¼ Watt unless otherwise noted

Integrated Circuits

IC 1 - LM318H
IC 2 - LM318H
IC3 to IC8 - LM318H
IC 9 - CA3083 (? 30183 ,80 Volt)
IC 10 - MC1595 with heat sink
IC 11 - SG4501

Transistors

Q1 - 2N3568 or equivalent
Q2 - 2N3646
Q3 - 2N5770 (note Q3 and Q4 should
Q4 - 2N5770 be strapped together)
Q5 - 2N2219A
Q6 - 2N3646
Q7 - 2N5770 Q9 - 40409
Q8 - 2N3646 Q10 - 40410

Diodes

D1 to D7 - 1N914A
(note : Diode leakage must be less than 1 uA at 15 Volt reverse bias)
D8 - 1N914
D9 - Zener 1N5248B

Resistors - (Values in ohms)

R1 - 10K 1%
R2 - 10K 1%
R3 - 4.7K
R4 - 10K 1%
R5 - 10K 1%
R6 - 4.7K
R7 - 10K 1%
R8 - 5K 1%
R9 - 10K 1%
R10 - 5K 1%
R11 - 5K 1%
R12 to R14 - 510 (possibly changed to 470 ohm)
R15 - 18K
R16 - 1K
R17 - 4.7K
R18 - 4.7K

Resistors (continued)

R19 - 20K 1%
R20 - 20K 1%
R21 - 10K 1%
R22 - 100K
R23 - 3.3K
R24 - 10K trim
R25 - 10K
R26 - 10K
R27 - 4.7K
R28 - 4.7K
R29 to R32 - All 510 ohm or all are 470 ohm
R33 - 100
R34 - 220
R35 - 220
R36 - 1K
R37 - 1K
R38 - 100
R39 - 1K
R40 - 100
R41 - 1K
R42 - 20K trim
R43 - 20K trim
R44 - 4.7K
R45 - 100K
R46 - 10
R47 - 100
R48 - 680
R49 - 510 ½ Watt (or 470)
R50 - 510 ½ Watt (or 470)
R51 - 1K
R52 - 1K
R53 - 10K
R54 - 220K
R55 - 510
R56 - 1K trim
R57 - 75
R58 - 1K
R59 - 10K
R60 - 10K
R61 - 2.7K
R62 - Dale 0.5 ohm 1%, 1 Watt
R63 - Dale 0.5 ohm 1% 1 Watt
R64 - 75

CRT DRIVER 1/16/75

alignment

Note: System should be warmed up for 5 minutes before alignment is attempted.

(1) Intensity offset – Tube Not cut off
HIN = 0V
Vin = 0V
Din = 0V
intensity pot all the way down
adjust R45 for NO visible picture or NO video on CRT cathode

(2) Black level – Self explanatory

(3) Low level Exponent adjust – adjust Tube cutoff
(Low level intensity) (set intensity to zero and just turn CRT spot out)
R56 all the way CCW – .7 volt pin 12, IC 10, Video in guided Black level is SET sizes and intensity for a picture. (very low level, small size)
adjust "Exponent adjust" for constant visual intensity as picture changes size.

(4) Break pt adj – adjust Size or intensity until shading error appears
try adjusting R56 until best shading vs. intensity occurs

RUTT ELECTROPHYSICS
21-29 West 4th Street, New York, N.Y., 10012 (212) 982-8300

11) ADD 2.7Ω [illegible] SERIES WITH B- TO Q-2, R-51, C-18

12) CHANGE C-18 TO 15uf 20V TANT (+ IS GND SIDE)

13) Change C-16 TO 15uf 25V

14) OMIT C-13 (BE SURE TO CHANGE R-27 GND)

5) PUT RESISTORS IN SERIES WITH ± 28V TO LIMIT 40409's (?) DISSAPATION

~~6) Change C-21 TO 1uf CER, or 2 THIS BACK TO BACK~~

7) " R-44 TO 10K FROM 100K (change noted in parts list)

8) " R-54 TO 220K (Change NOTED ON PARTS LIST)

9) ADD 470K FROM (C-22, R28, 22) TO PIN 2 of IC-8
THIS OFFSETS LOG CIRCUIT TO HELP LINEARIZE INTENSITY INPUT

10) Change R-44 FROM 10K TO 4.7K
change NOTED ON PARTS LIST

NOTE a) "WHITE STREACH" IS '<u>OFF</u>' WHEN POT IS C.W.

b) R-46 + R-47 CONTROL GAIN OF MULT. AMP.
IF GAIN IS TO HIGH (TO MUCH CONTRAST) RAISE THEIR VALUE (IN PROPORTION) + YOU WILL reduce GAIN
+ <u>LOWER</u> C-9 BY THE SAME PROPORTION

Layout Note (over for alignment inst)

Marked (*) resistors are 1% or better (preferably Metal film) (different size?)

1K : 2K
IS INDEPENDENT
FROM 10K : 20K

Heavy ± 15V trace

ground plane

leave ICs 2,4,5,6,7,8 equidistant (about 1 inch) from IC9 for thermal

Short lead CRT cathode lead

You can move inputs (V in H in D in) together to a convenient spot

Video in cannot be moved

Video 75Ω load is now at BNC panel connector

Q-3 & 4 SHOULD BE TIED TOGETHER for heat transfer with silicone

PC 132 Parts List- High Resolution CRT Driver

with V, H, D^2 Correction (continued)

Revised Jan. 16, 1975 retyped by Jeffrey Schier 6/1/78

Resistors (continued)

Note-- all values in ohms
5% ¼ Watt unless otherwise noted

R65 - 75 ohm
R66 - 20K trim (GR10 #1)
R67 - 4.7K

Capacitors (continued)

C34 - 6.8 uf 35 VDC (Tantalum)
C35 - ? uf ceramic disc
over 300 volt
C36 - 0.01uf 1KV ceramic disc
C37 - 0.01 uf 1KV " "
C38 - 0.01 uf 1KV " "
C39 - 0.01 uf 1KV " "

Capacitors

C1 - 47 pf ceramic disc
C2 - 47 pf " "
C3 - 47 pf " "
C4 - 47 pf " "
C5 - 47 pf " "
C6 - 10 pf
C7 - 10 pf " "
* C8 - 100 pf " "
* C9 - 100 pf " "
C10 - 15 uF @ 20 Volts (Tantalum)
C11 - 15 uf @ 20 Volts " "
C12 - 22 uf @ 50 Volts " "
C13 - 0.1 uf ceramic disc
C14 - 0.1 uf " "
C15 - 0.1 uf " "
C16 - 0.1 uf " "
C17 - 0.1 uf " "
C18 - 0.1 uf " "
C19 - 0.1 uf " "
C20 - 0.1 uf " "
C21 - 15 uf / 20 Volt (Tantalum)
C22 - 0.1 uf ceramic disc
C23 - 0.1 uf " "
C24 - 0.1 uf " "
C25 - 220 pf " "
C26 - 220 pf " "
C27 - 0.1 uf
C28 - 0.1 uf
C29 - 0.1 uf ceramic disc
C30 - 0.01 uf " "
C31 - 0.01 uf " "
C32 - 6.8 uf / 35 VDC (Tantalum)
C33 - 6.8 uf / 35 VDC " "

* Compensation Capacitors should be adjusted for High Frequency Bandwidth

CRT DRIVER (PC-132) 1/16/75 retyped 2/10/78
by Jeff Schier

Alignment Procedure

Note : System should be warmed up, for 5 minutes
before alignment is attemped.

1) Intensity Offset - Tube not cut-off when
Hin = zero volts
Vin = zero volts
Din = zero volts
Intensity Pot all the way 'down'

Procedure - Set controls to the above values. Adjust
R45 for No visible picture, or no Video on Crt Cathode

2) Black Level - Self explanatory

3) Low Level Exponential Adjust -
Procedure - Adjust tube cutoff (set intensity to zero, and
just turn Crt spot out.
For 'low level intensity' turn R56 all the way CCW.
Black level, is -0.7 volts at IC10/Pin 12, with Video grounded.
Set sizes and intensity, for a picture (Very low level,
small size picture)
Adjust "exponent adjust" for a constant 'Visual' intensity,
as the picture is changed in size.

4) Break Point Adjust - Adjust size or intensity, until shading
error appears. Try adjusting R56 until shading vs. intensity
is at its best value.

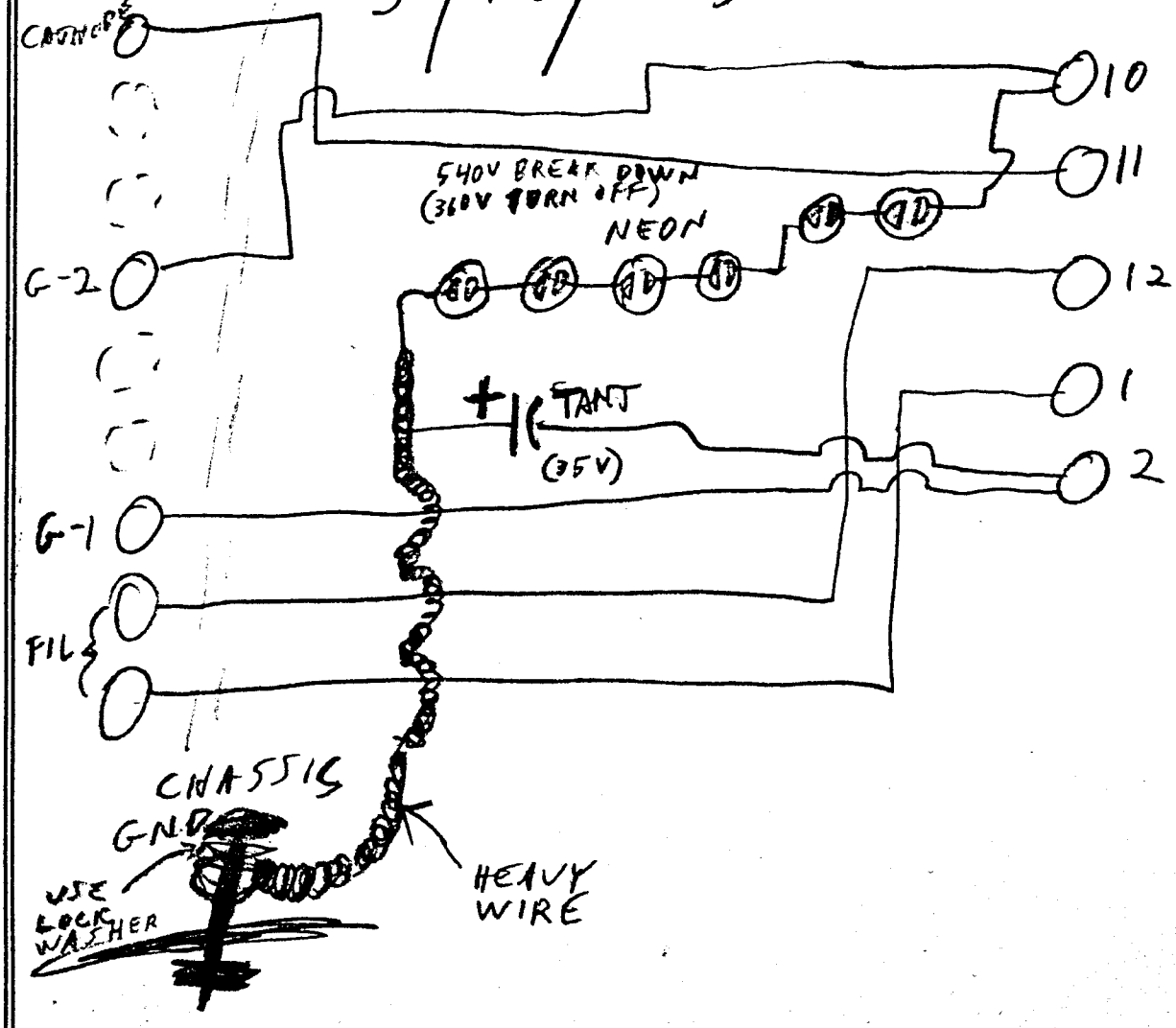
Layout Notes

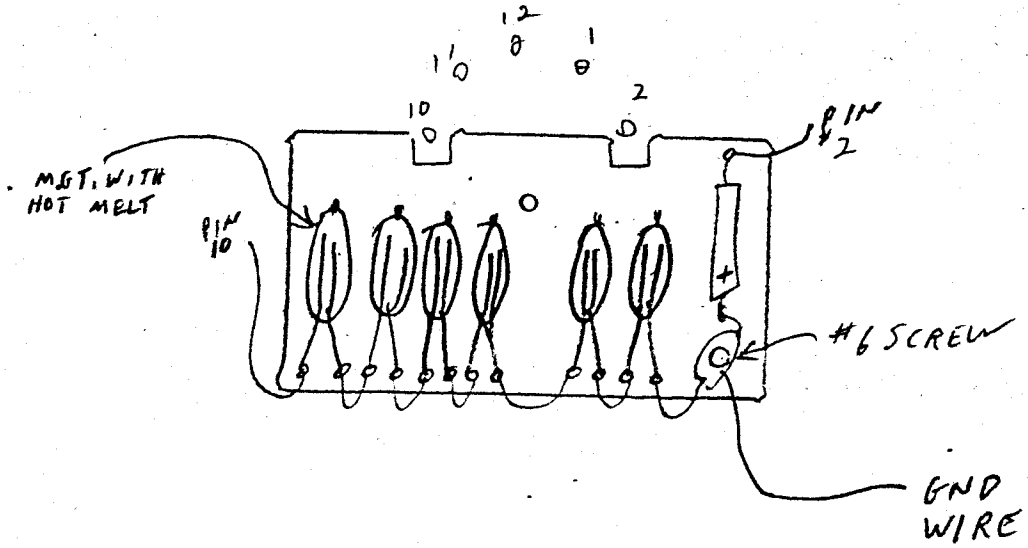
Marked (*)resistors are 1% or better (preferably metal film)
(different size?) 1K : 2K is independent from 10K to 20K

Heavy + and - 15 Volt traces.
A Ground Plane
Leave IC's 2,3,4,5,6,7,8 equidistant
(about 1 inch) from IC9, for thermal reasons.
A short length CRT cathode lead.
You can move inputs (Vin,Hin, Din) together to a convenient spot.
Video input cannot be moved.
Video 75 ohm load is now at the BNC panel connector.
Q3 and Q4 should strapped together, for heat transfer, with
silicone between the transistors.

CRT SOCKET FOR PC-132

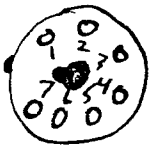
3/13/75





PC-132 TUBE SOCKET CONNECTIONS

PANASONIC TUBE

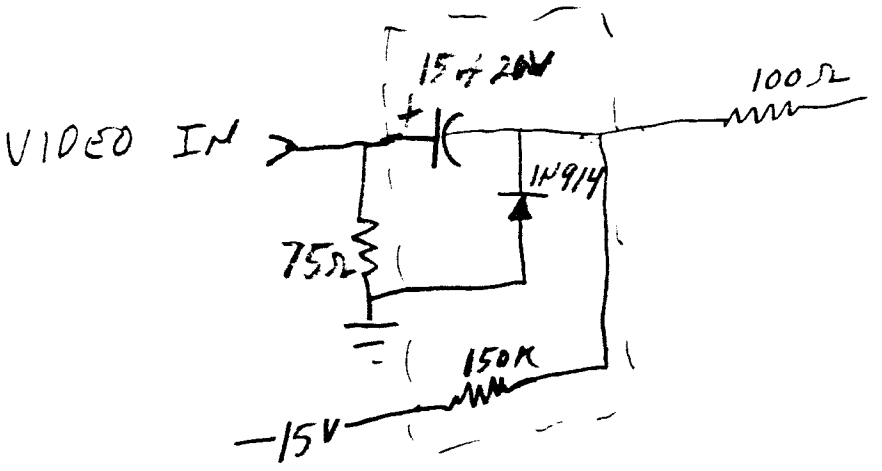


BACK VIEW

1) KATHODE (GREEN)
2) G-2 (YELLOW) +500V
3) FIL. (BROWN) } 12.6V
4) FIL. (BLACK) }
5) G-1 (RED)
6) DO NOT USE
7) G-3 (ORANGE) FOCUS WIPER 0 TO +500V

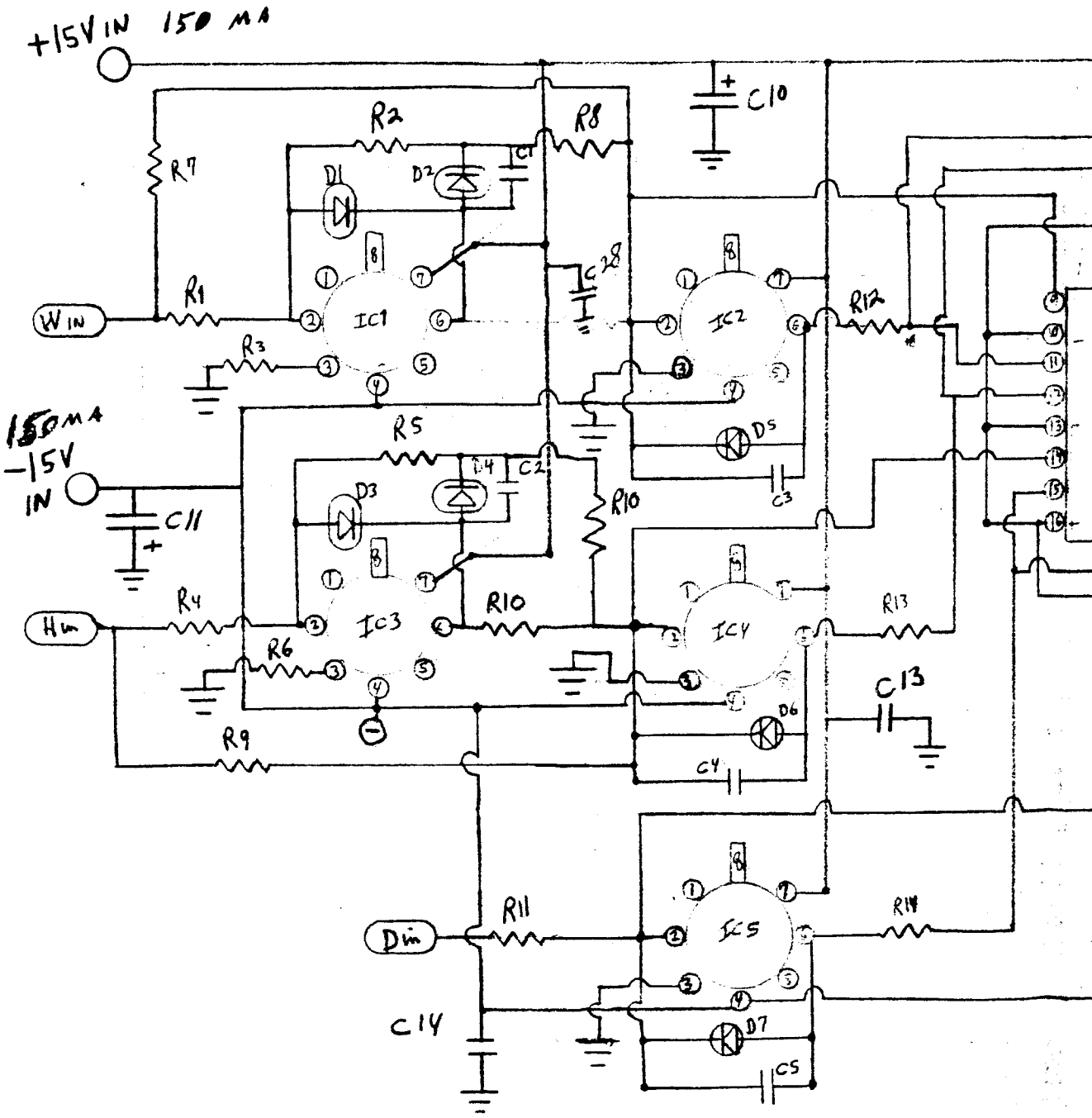
PC-132 CHICAGO

VIDEO CLAMP

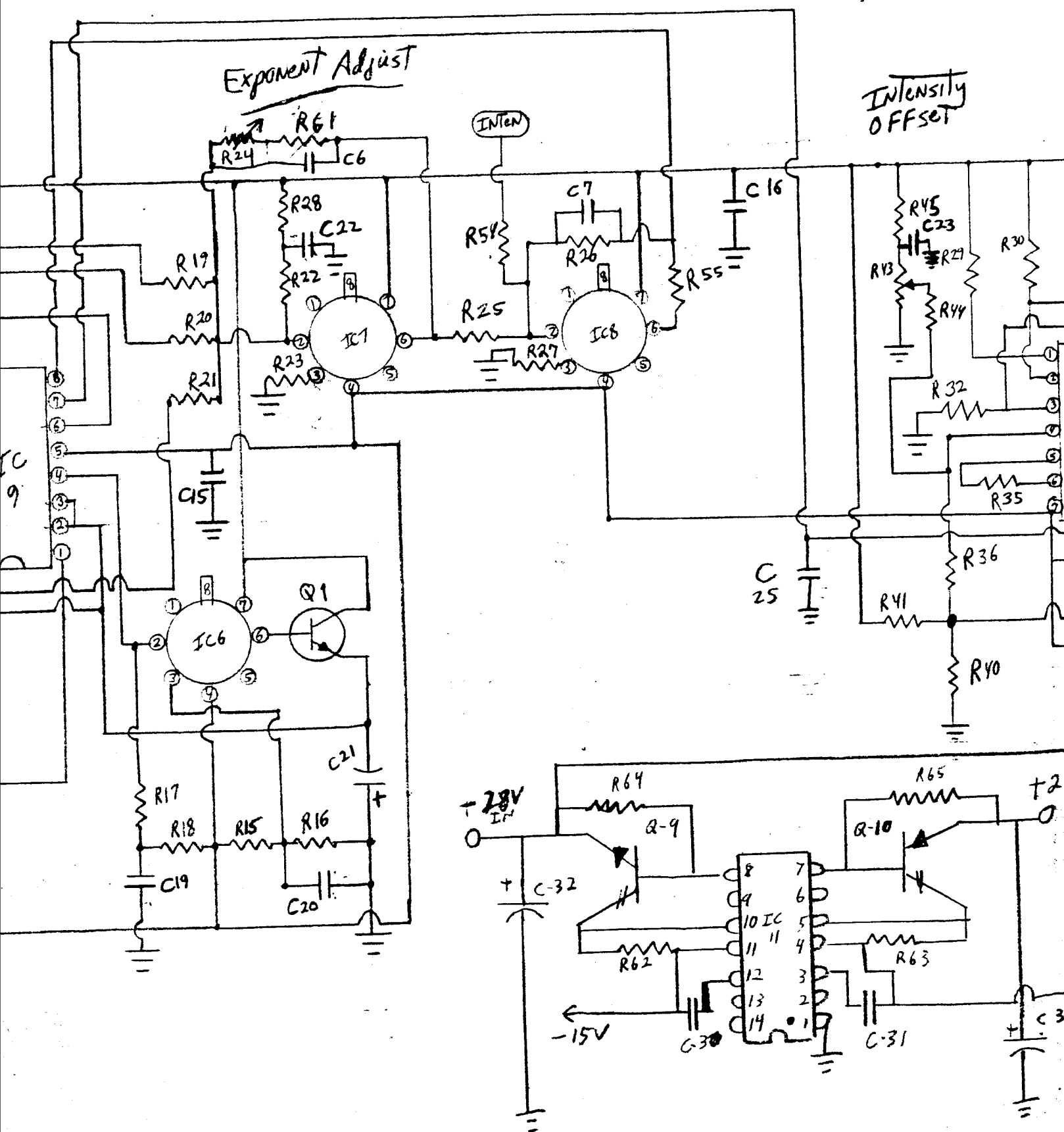


Rull High Resolution CRT

1/2/75 Robert Diam



DRIVER WITH H.V.D.C. COMPENSATION



Matsushita Electronics Corporation

Telephone No.
TAKATSUKI (82) 5521

Takatsuki, Osaka, Japan
Telex: MECTRON J63461

Cable Address
"MECTRON" TAKATSUKI

140AKB4

CATHODE RAY TUBE

The 140AKB4 is a 5"-55°, directly viewed, rectangular, glass picture tube of the low voltage electro-static focus and magnetic deflection type. The 140AKB4 employes a very small diameter neck of 0.788". The 140AKB4 has a 12.6 volts 64 milliampere heater and its maximum overall length is 7.953 max. inches thus very suitable for micro portable T.V. set.

GENERAL DATA

ELECTRICAL DATA

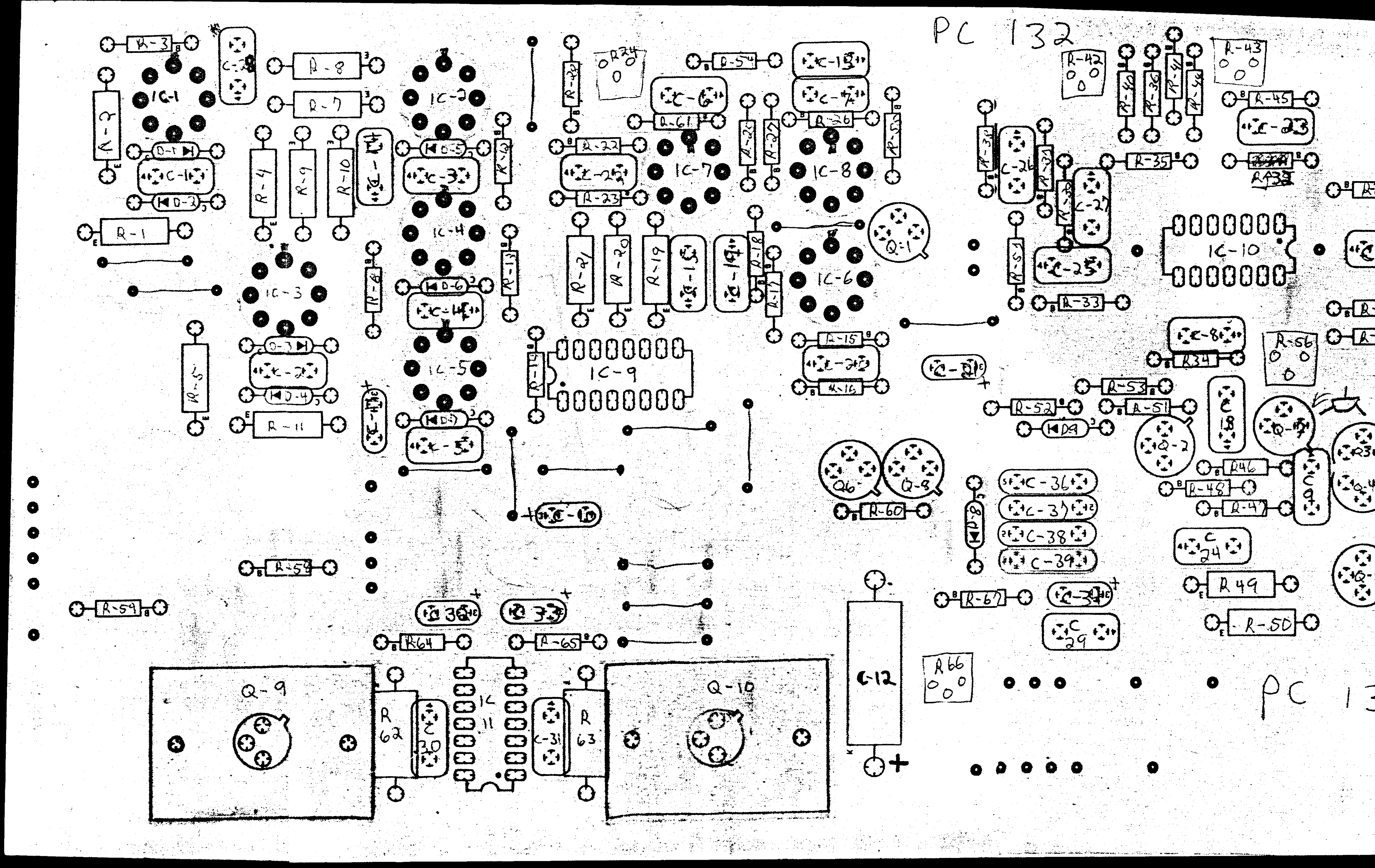
Heater Current at 12.6 volts	64 mA
Direct Interelectrode Capacitance:	
Grid No.1 to all other electrodes	7 pF
Cathode to all other electrodes	4 pF
External conductive coating to anode	400 max pF 200 min pF
Focusing Method	Electrostatic
Deflection Method	Magnetic
Deflection Angles (Approx.)	
Diagonal	55 degrees
Horizontal	degrees
Vertical	degrees
Electron Gun:	
Ion trap	Not Required
Focus lens	Tripotential

OFFICIAL DATA

Faceplate	Filterglass
Light transmission at center (Approx.)	70%
Phosphor	P4-Sulfide Type Aluminized
Fluorescence	White
Persistence	Medium short

MECHANICAL DATA

Tube Dimentions:	
Overall length:	7.953" max. (202 mm)
Greatest dimensions of tube:	
Diagonal	5.406"±0.078" (137.3±2) mm
Width	4.732"±0.078" (120.2±2) mm
Height	3.760"±0.078" (95.5±2) mm


PC 132
IC-1
IC-2
IC-3
IC-4
IC-5
IC-6
IC-7
IC-8
IC-9
IC-10
Q-9
Q-10
C-12
R66

MODULE MULTIPIER PARTS LIST

DEC. 1974

IC-1 MC-1494
IC-2 LM318
IC-3 "
IC-4 "

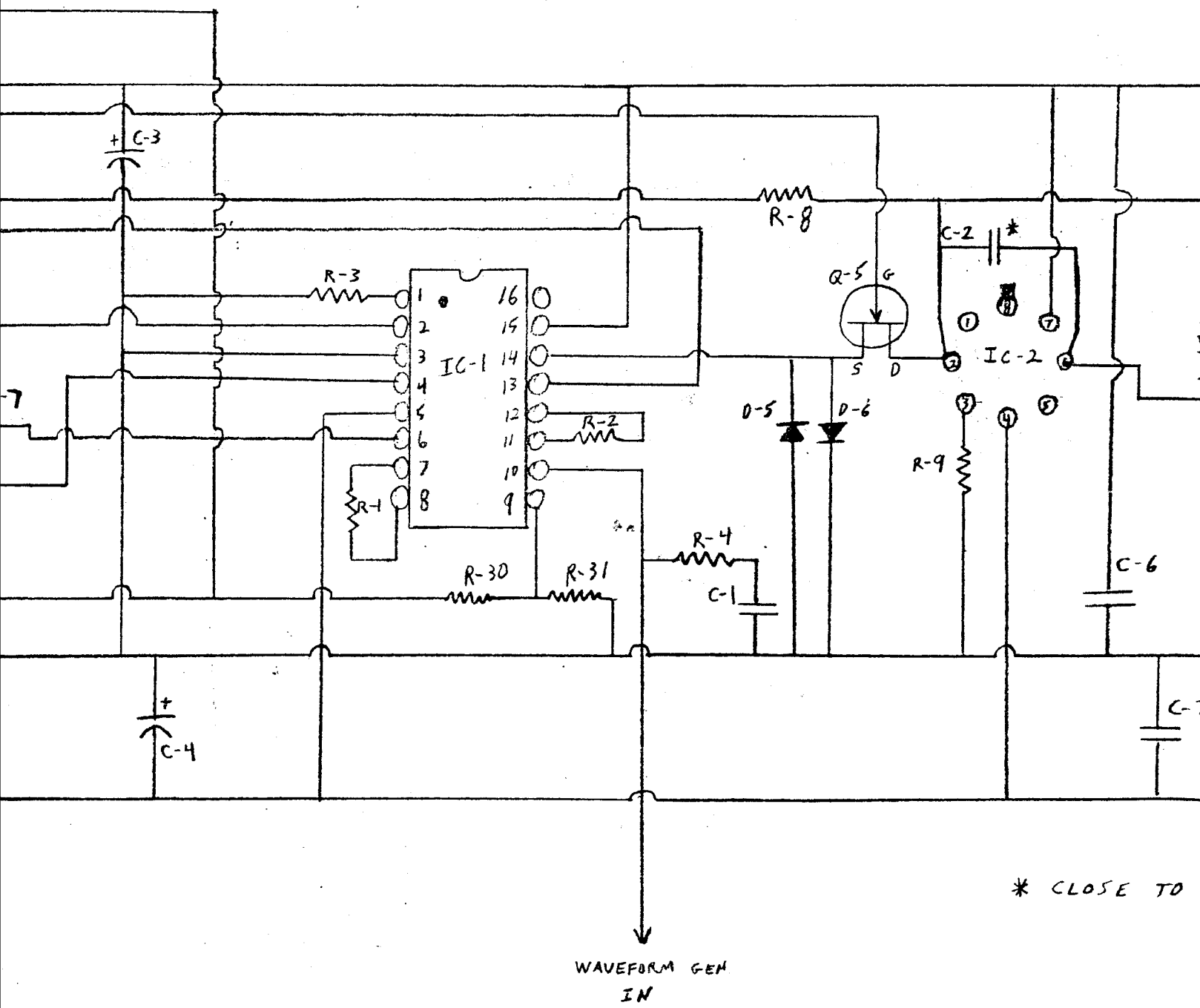
D-1 IN914
D-2 IN914
D-3 "
D-4 "
D-5
D-6 "

Q-1 NPN 2N3568
Q-2 PNP 2N3638A
Q-3 NPN
Q-4 PNP

4 C-1
4 C-2 10 PF
3 C-3 15 uf 20V
3 C-4 15 uf 20V
4 C-5 10 PF
4 C-6 .1 CER
4 C-7 .1 CER
C-8 10PF

R-1 27K
R-2 15K
R-3 12K
R-4
R-5 20K POT
R-6 20K POT
R-7 20K POT
R-8 47K
R-9 10K
R-10 10K
R-11 10Ω
R-12 10Ω
R-13 100K POT
R-14
R-15 10K 5%
R-16 10K 5%
R-17 10K
R-18 10K
R-19 10Ω
R-20 10Ω
R-21
R-22 6.8K
R-23 20K
R-24 6.8K
R-25
R-26 10K
R-27 20K
R-28 15K
R-29 10K
R-30 OMIT
R-30 2.2K
R-31 10K

Q-1 NPN 2N3568
Q-2 PNP 2N3638A
Q-3 NPN 2N3568
Q-4 PNP 2N3638A
Q-5 FET
Q-6 NPN 2N3568
Q-7 NPN 2N3568
Q-8 NPN 2N3568

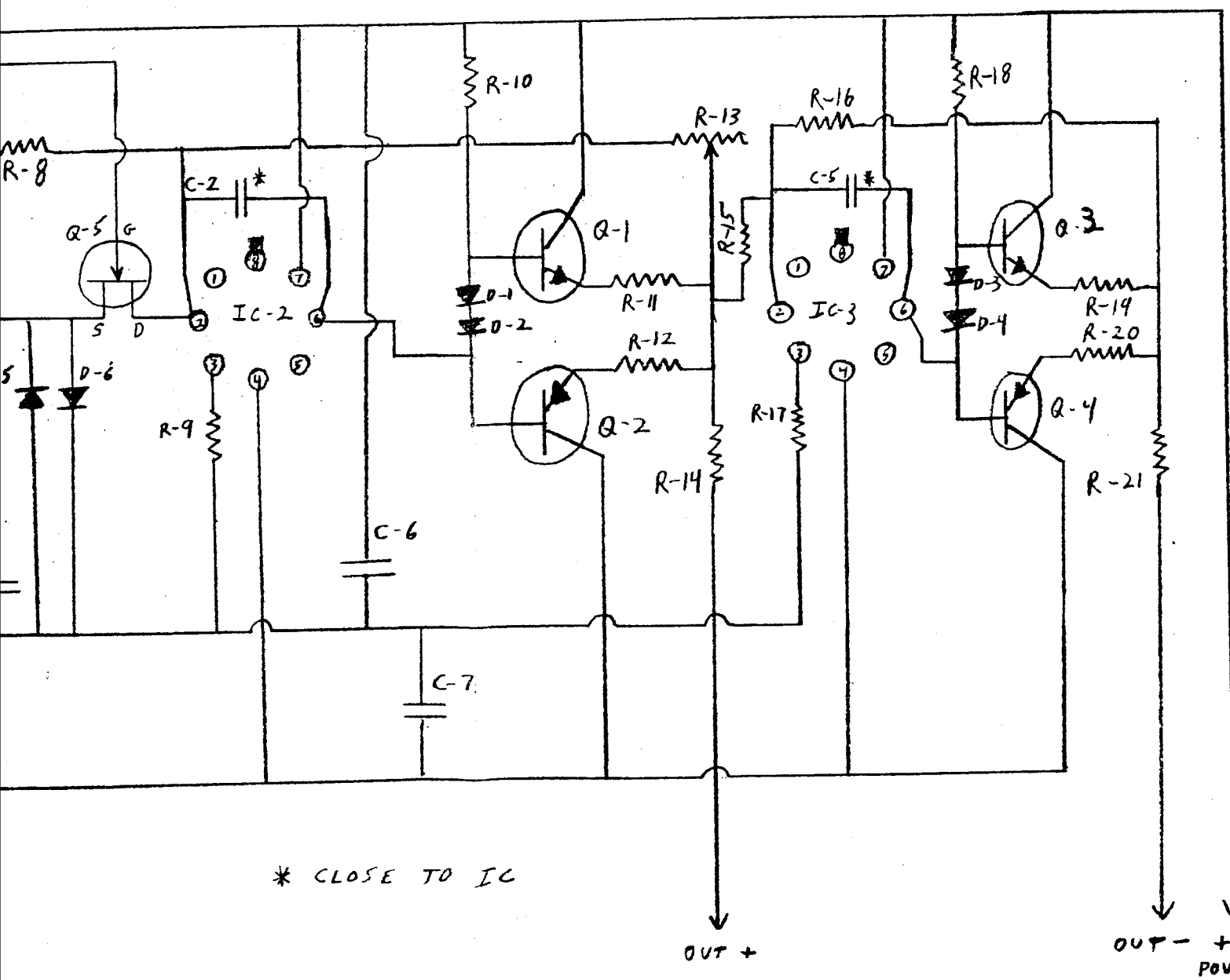

C-3
R-8
C-2
*
R-3
Q-5
G
S
D
IC-1
IC-2
D-5
D-6
R-2
R-1
R-9
R-4
C-1
R-30
R-31
C-6
C-4
WAVEFORM GEN
IN

* CLOSE TO

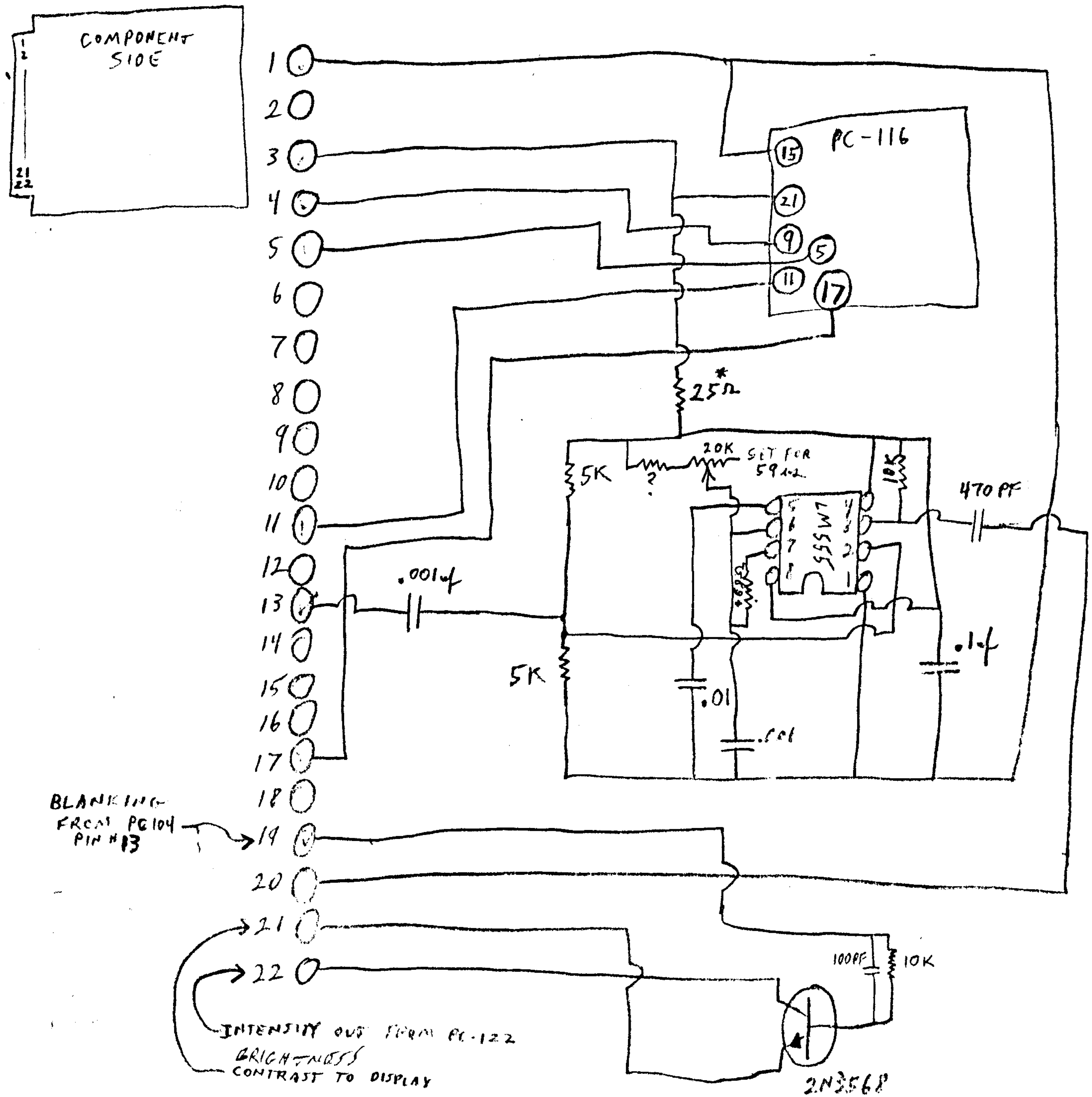
RUTT ELECTROPHYSICS CORP

MODULE MULTIPLIER

DEC, 1974



* CLOSE TO IC

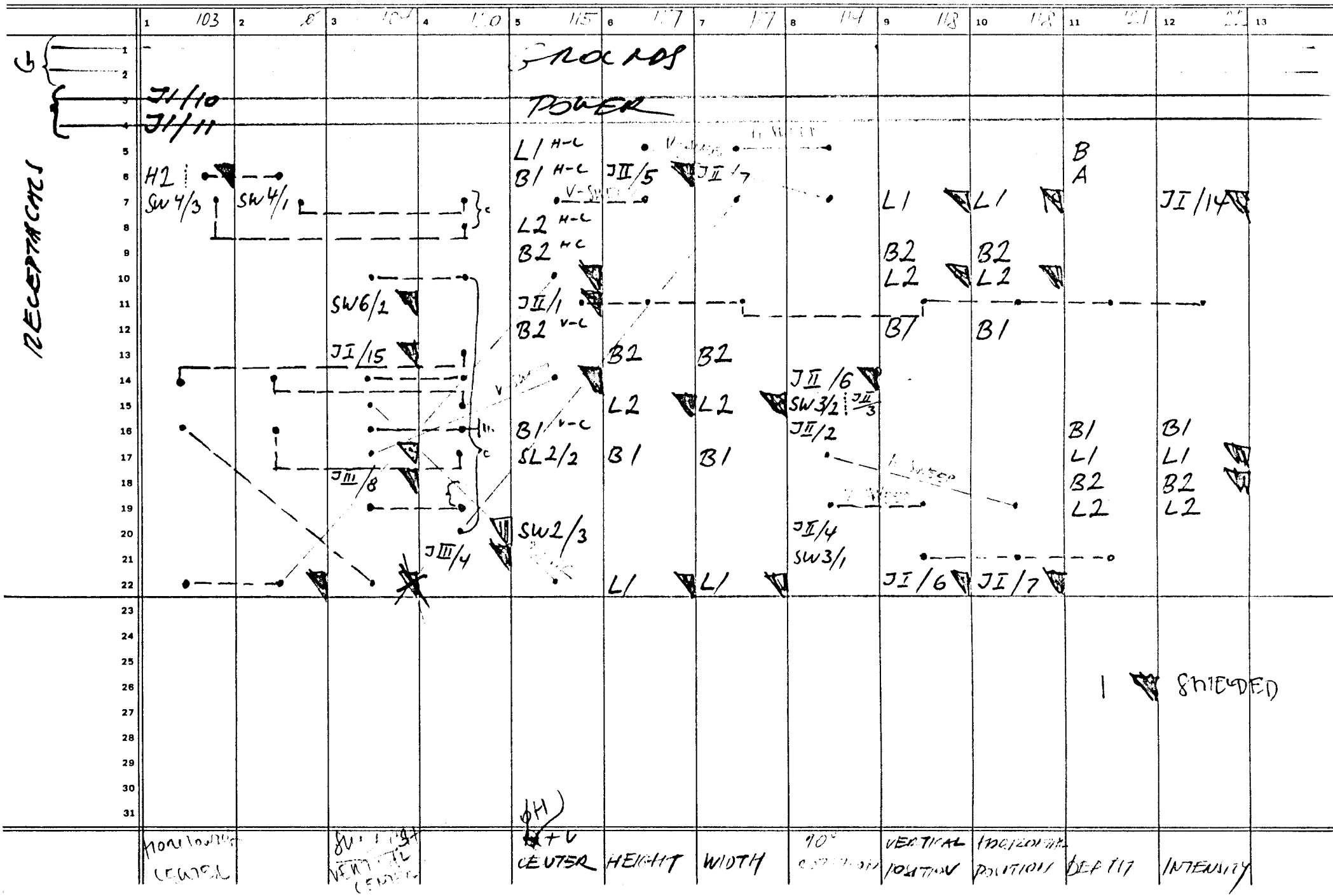


* RES TOL +100% − 50%

AMPAD EFFICIENCY LINE NO 6636

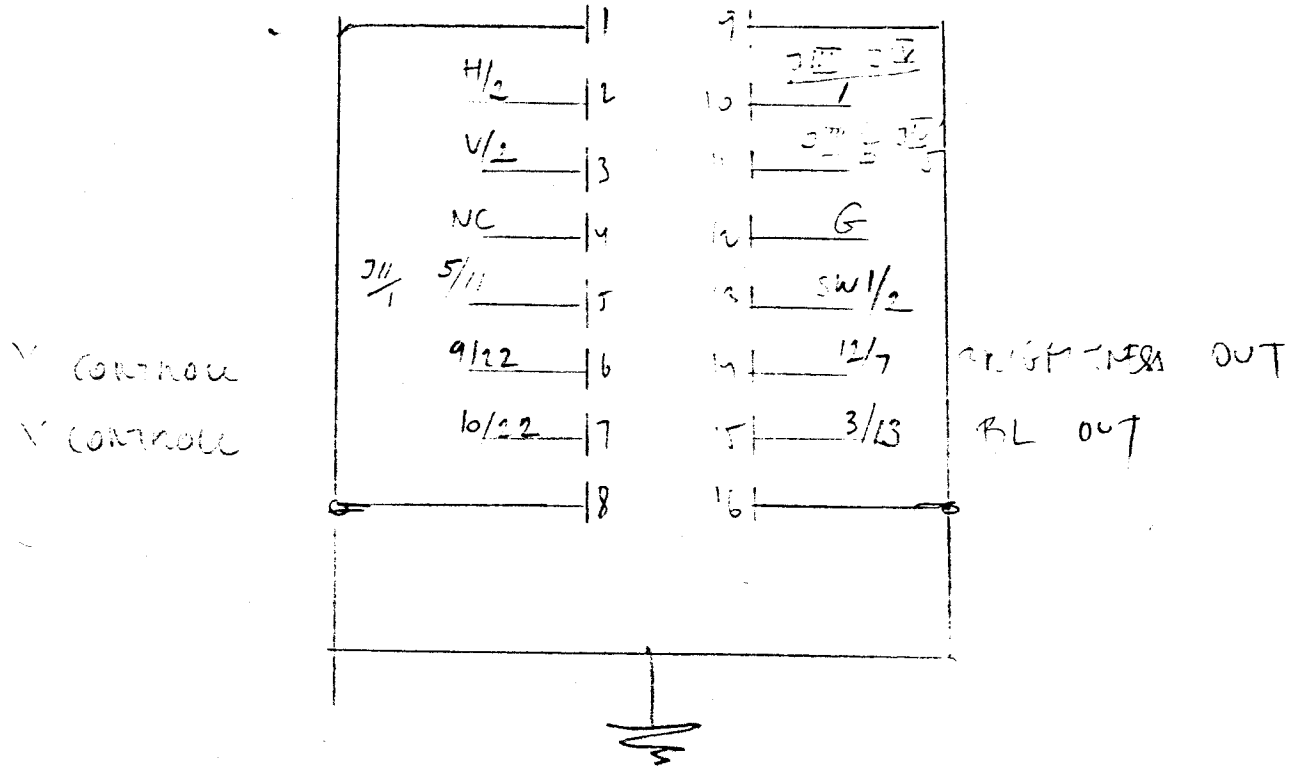
R/E CONTROL UNIT

SLOTS:

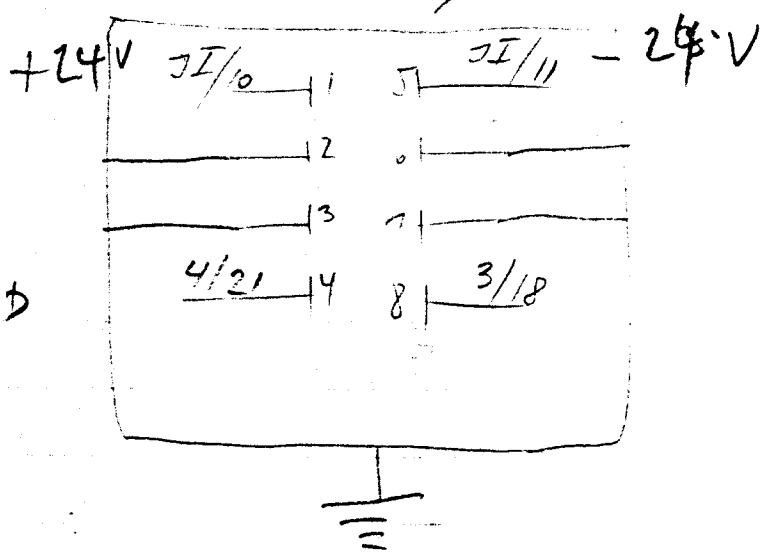


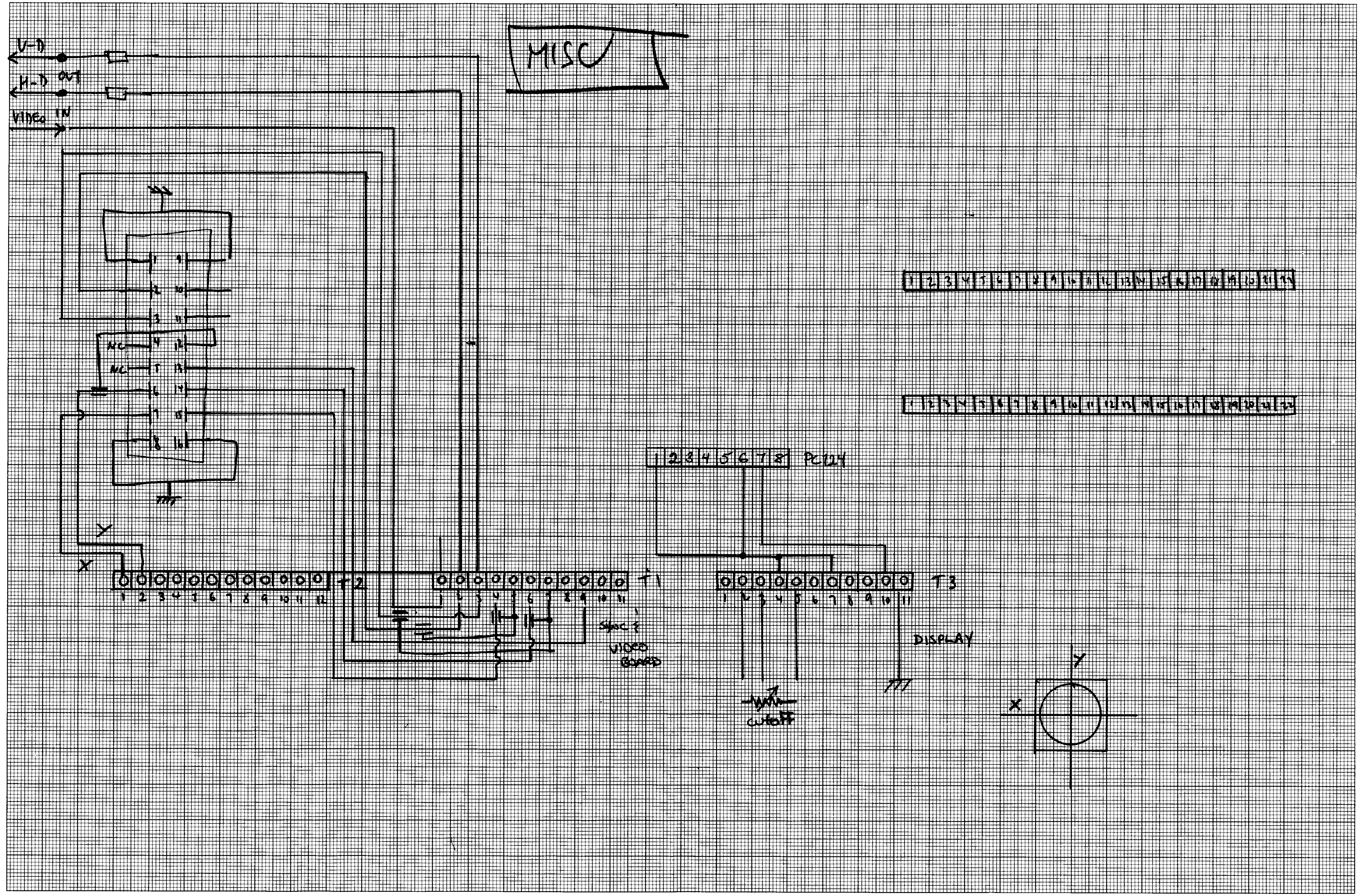
CONTROL UNIT.

J I.



J III / IV





WAVEFORM GENERATOR

PC-55

PC-56

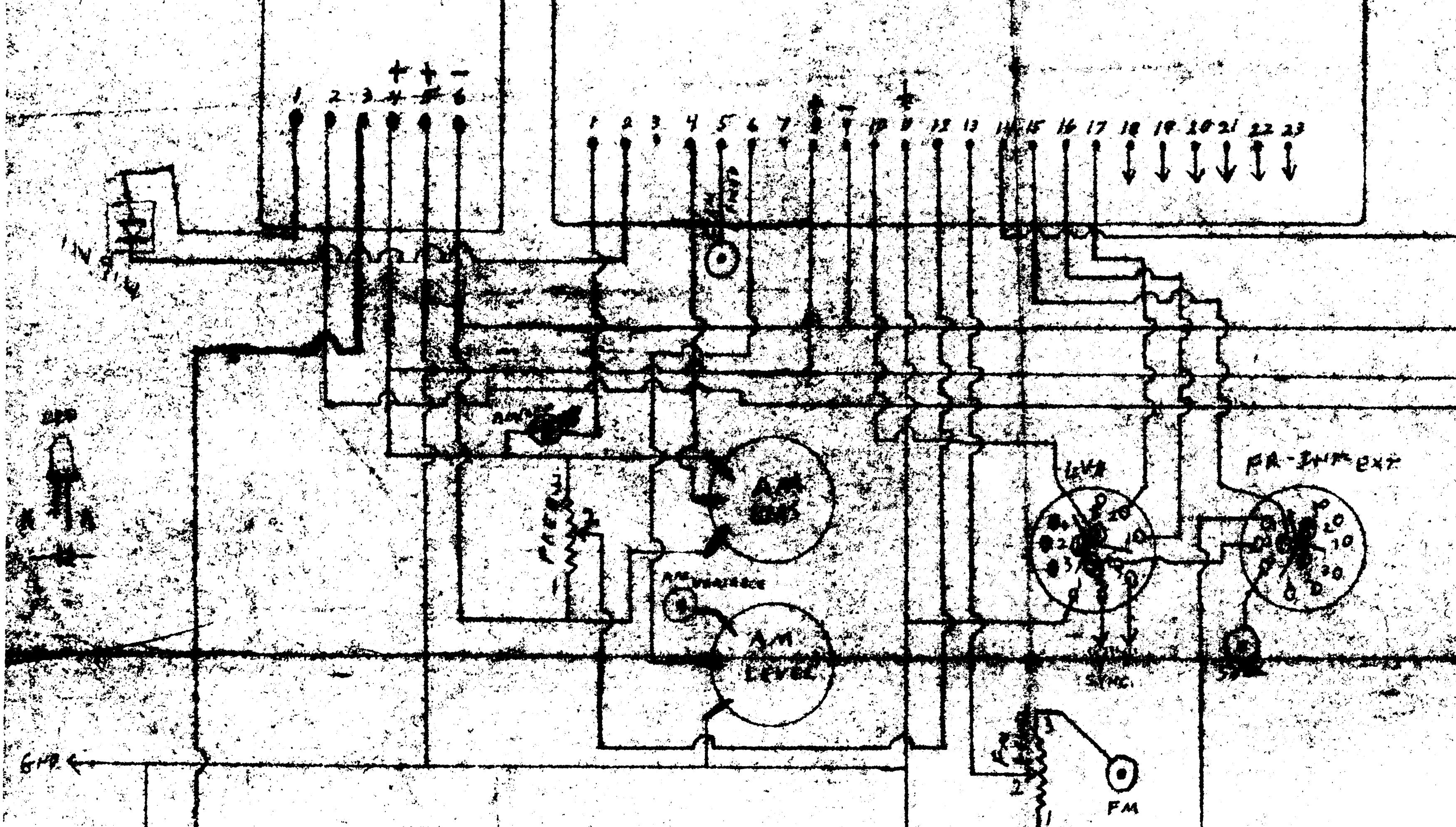
PC-54 ∼

PC-54 N

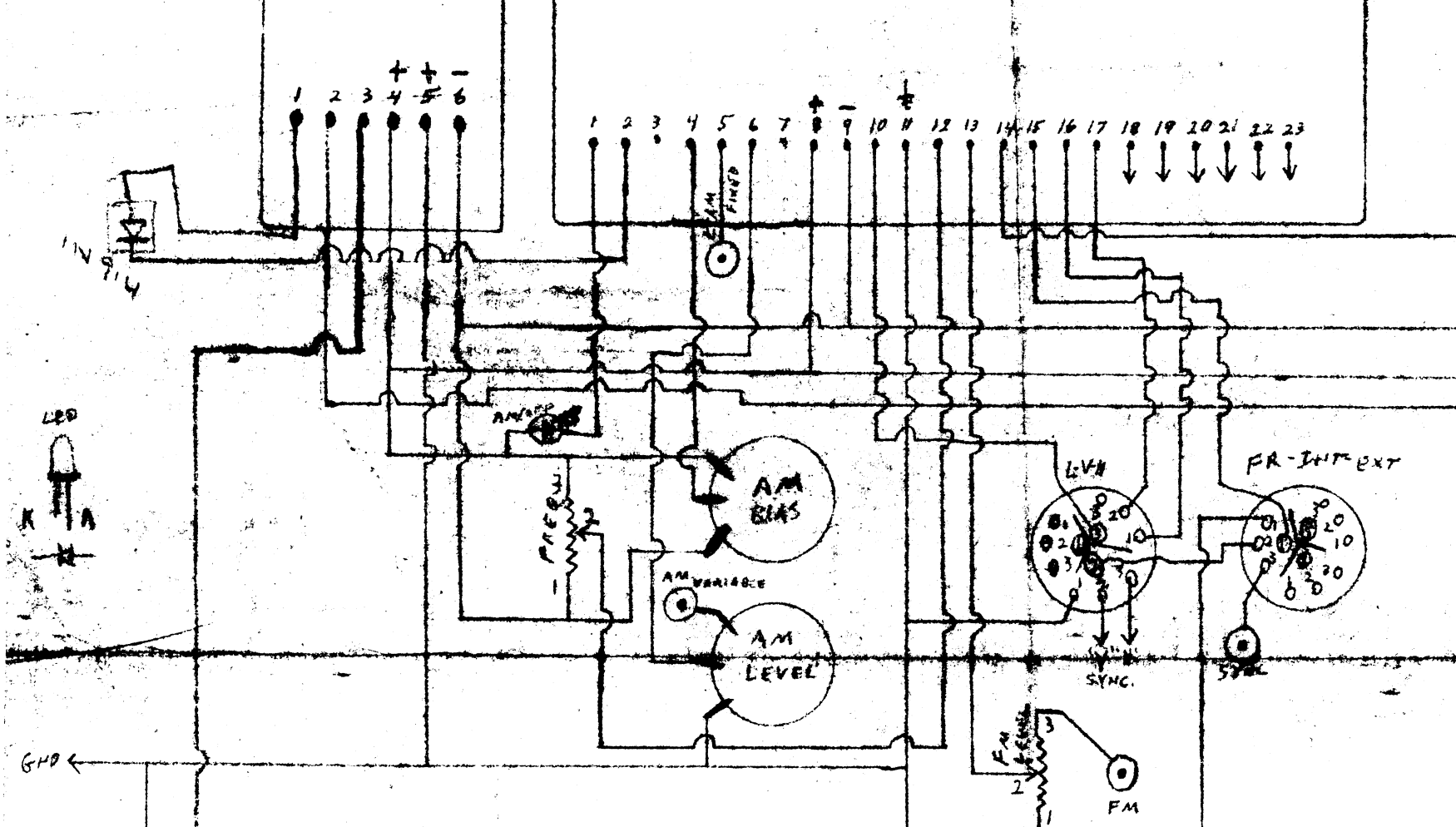
PC-54 ⊓

PC-54 AM

∼-N-⊓



1 2 3 4 5 6
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
AM OUT
AM LEVEL
LEV
SYNC
FM
GND


1 2 3 4 5 6
+ + −
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
+ − +
AM FIXED
1N 914
LED
K A
AM BIAS
AM VARIABLE
AM LEVEL
FREQ
LVL
FR-INT-EXT
SYNC.
FM
GND